MEDICAL LIBRARY

The

Research Quarterly

of the

American Physical Education Asso

VOL. VI MARCH, 1935

Applications of the Objective Method of Grading Posture Standards, and the Prediction of Individual Group Improvement. *Charlotte E. Wolfleam, Elizabeth and Eugene C. Howe* . . . . . .

Achievement Scales in Physical Education for College *Frederick W. Cozens and Hazel J.* . . . .

The Response of the Heart to Water of Swimming Temperature. *W. W. Tuttle and C. V. Cozens* . . .

The Use of Intramural Participation Statistics. *H. Harrison Clarke* . . . . . .

The Objective Measurement of Skill in the Teaching of Dancing to University Women. *Mary Effie Shambaugh* . . .

The Utilization of McCloy's Athletic Index with the Achievement Scales. *Edith Manchester* . . . .

A Classified List of Current Periodicals in the Fields of Athletics, Health, Physical Education and Sports Published in the United States and Canada. *Aloha B. Rodgers* . . .

Guide to Sports and Outdoor Recreation: A Selected List of Books, 1918 to December 31, 1934. *Wilma M.* . . .

Book Reviews . . . . . .

Published March, May, [illegible] November

Address: 311 Maynard, Ann Arbor, Michigan Subscription [illegible]

PERIODICALS
BOOKS
GENERAL PRINTING

Prompt Service
Workmanship
Moderate Prices

Ask for Quotations

THE ANN ARBOR PRESS

317 Maynard Street

Ann Arbor Michigan

Copyright 1935 by American Physical Education Association
Entered as second class matter March 22, 1930, at the Post Office at Ann Arbor, Michigan, under the act of March 3, 1879

The Research Quarterly

of the

American Physical Education Association

Vol. VI MARCH, 1935 No. 1

CONTENTS

Applications of the Objective Method of Grading Posture, Posture Standards, and the Prediction of Individual and Group Improvement. *Charlotte G. MacEwan, Elizabeth Powell, and Eugene C. Howe* 3

Achievement Scales in Physical Education for College Women. *Frederick W. Cozens and Hazel J. Cubberley* 14

The Response of the Heart to Water of Swimming Pool Temperature. *W. W. Tuttle and John F. Corleaux* 24

The Use of Intramural Participation Statistics. *H. Harrison Clarke* 27

The Objective Measurement of Success in the Teaching of Folk Dancing to University Women. *Mary Effie Shambaugh, Ph.D.* 33

The Utilization of McCloy's Athletic Index with the California Achievement Scales. *Karl W. Bookwalter* 59

A Classified List of Current Periodicals in the Fields of Athletics, Health, Physical Education, and Sports Published in the United States and Canada. *Aletha B. Redman* 63

Guide to Sports and Outdoor Recreations: A Selected List of Books, 1918 to December 31, 1934. *Wilson M. Ranck* 75

Book Reviews 152

CONTRIBUTING EDITORS

G. B. Affleck
Dorothy Ainsworth, Ph.D.
V. S. Blanchard
John Bovard, Ph.D.
David K. Brace, Ph.D.
A. D. Browne, M.D.
C. L. Brownell, Ph.D.
Rosalind Cassidy
Charles C. Cowell, Ph.D.
Frederick Cozens, Ph.D.
A. Lester Crapser, Ph.D.
Ruth Elliott, Ph.D.
Marguerite M. Hussey, Ph.D.
Peter V. Karpovich, M.D.
Charles H. Keene, M.D.
Frank L. Kleeberger, M.D.
Clair V. Langton, D.P.H.
William R. LaPorte
Mabel Lee
Frank Lloyd, Ph.D.
F. W. Luehring
C. H. McCloy, Ph.D.
J. H. McCurdy, M.D.
C. M. Miles
Gertrude E. Moulton, M.D.
Jay B. Nash, Ph.D.
N. P. Neilson
D. Oberteuffer, Ph.D.
Frederick Prosch
F. R. Rogers, Ph.D.
Harry A. Scott, Ph.D.
J. R. Sharman, Ph.D.
George T. Stafford
Arthur H Steinhaus, Ph.D.
Alden W. Thompson
W. W. Tuttle, Ph.D.
Agnes Wayman
Jesse F. Williams, M.D.

Published March, May, October, and December
ELMER D. MITCHELL, *Editor*
311 Maynard, Ann Arbor, Michigan
Subscription $3.00 per year Single Copies, $1.00 each.

American Physical Education Association Officers

President, STRONG HINMAN, Public Schools, Wichita, Kansas.
Vice-President, AGNES WAYMAN, Barnard College, New York City.
Secretary-Editor, E. D. MITCHELL, University of Michigan, Ann Arbor.
Chairman Field Service, JAMES E. ROGERS, 315 Fourth Ave., New York City.

Additional Members of Executive Committee

Mary Channing Coleman, Woman's College, University of North Carolina, Greensboro.
Ruth Elliott, Wellesley College, Wellesley, Massachusetts.
Jessie R. Garrison, Dept. of Education, Montgomery, Alabama.
William R. LaPorte, University of Southern California, Los Angeles.
Guy S. Lowman, University of Wisconsin, Madison.
W. G. Moorhead, Dept. of Public Instruction, Harrisburg, Pennsylvania.
Jay B. Nash, Ph.D., New York University, New York City.
Clare Small, University of Colorado, Boulder.
Ruth Weythman, State Normal School, Bellingham, Washington.

Officers of Eastern District Association

President, Jay B. Nash, Ph.D., New York University, New York City.
Vice-President, Franklin J. Gray, Director of Physical Education, Springfield, Mass.
Secretary-Treasurer, Grace Jones, Public Schools, Summit, N. J.

Officers of Mid-West District Association

President, Guy S. Lowman, University of Wisconsin, Madison.
Vice-President, Helen N. Smith, University of Cincinnati, Cincinnati, Ohio.
Secretary-Treasurer, Birch Bayh, Public Schools, Terre Haute, Indiana.

Officers of Central District Association

President, Clare Small, University of Colorado, Boulder.
President-Elect, Louis Hutto, Des Moines, Iowa, Public Schools.
Vice-President, Edna McCullough, Kansas State Teachers College, Emporia.
Secretary-Treasurer, A. O. Anderson, Public Schools, Kansas City, Missouri.

Officers of Southern District Association

President, Jessie R. Garrison, Dept. of Education, Montgomery, Alabama.
President-Elect, Harry A. Scott, Ph.D., Rice Institute, Houston, Texas.
Vice-President, Mrs. Mary E. L. Soule, University of Georgia, Athens.
Secretary, Romayne Berryman, Mississippi State College for Women, Columbus.
Treasurer, Bennie Strickland, Austin, Texas.

Officers of Northwest District Association

President, Ruth Weythman, State Normal School, Bellingham, Washington.
First Vice-President, Christian Brocar, Public Schools, Spokane, Washington.
Second Vice-President, Margaret Duncan, University of Oregon, Eugene.
Secretary-Treasurer, R. E. Belshaw, University of Washington, Seattle.

Officers of Southwest District Association

President, W. R. LaPorte, University of Southern California, Los Angeles.
Vice-President, Ina Gittings, University of Arizona, Tucson.
Secretary-Treasurer, Wilma Jeppson, Brigham Young University, Provo, Utah.

Members of Legislative Council

(The Officers and Executive Committee are also included.)

Ruth H. Atwell, District of Columbia Society.
W. C. Batchelor, Recreation Section.
Birch E. Bayh, Indiana State Society.
Marjorie Bouvé, Massachusetts State Society
John Brown, Jr., M.D., Y.M.C.A. Physical Directors' Society.
A. D. Browne, M.D., Tennessee Society.
William Burdick, M.D., Maryland Society.
C. H. Burkhardt, New York State Society.
L. R. Burnett, M.D., Administrative Directors' Society.
Harry B. Burns, M.D., Pennsylvania State Society.
Rosalind Cassidy, National Association of Directors of Physical Education for College Women.
Ellis H. Champlin, New York State Society.
Helen Cooper, Rhode Island State Society.
Charles W. Davis, California State Society.
Henry E. Detherage, Missouri State Society.
Ruth Elliott, Teacher-Training Section.
Herschell Emery, Oklahoma State Society.
Edgar G. Everts, Minnesota State Society.
Henry M. Foster, Washington State Society.
Charles Forsythe, Michigan State Society.
Edith M. Gates, Y.W.C.A. Physical Directors' Society.
Edith M. Gates, Women's Division, N. A. A. F.
George Gauthier, Men's Athletic Section.
Major E. V. Graves, Virginia State Society.
Karl Greenlee, Iowa State Society.
Willard N. Greim, Colorado State Society.
Helen W. Hazelton, Indiana State Society.
W. L. Hughes, Ph.D., College Men's Physical Education Section.
Dorothy Nash Hutchinson, North Carolina State Society.
Allen G. Ireland, M.D., New Jersey Society.
Hiram A. Jones, PhD., New York Society.
Barbara Ellen Joy, Camping Section.
C. Walter Kadel, Delaware State Society.
Earl Kaufman, Jr., Kansas State Society.
Albert Kinoy, New York State Society.
Clyde Knapp, Nebraska State Society.
Louis Kulcinski, Illinois State Society.
A. S. Lamb, M.D., Canada.
Clair V. Langton, D.P.H., Oregon Society.
Helen A. Lengyel, Maine State Society.
R. H. MacAlister, Kansas State Society.
J. H. McCurdy, M.D., National Collegiate Athletic Association.
J. H. McCurdy, M.D., Research Section.
Harlan G. Metcalf, Therapeutic Section.
W. G. Moorhead, Pennsylvania Society.
Alfreda Mosscrop, Alabama State Society.
Robert Munsey, California State Society.
Ruth L. Murray, Michigan State Society.
J. H. Nichols, M.D., Ohio State Society.
Harry Nissen, Massachusetts State Society.
D. Oberteuffer, Ph.D., Ohio State Society.
Julia Post, South Carolina State Society.
Charles J. Prohaska, M.D., Society of State Directors.
Frederick Prosch, Pennsylvania Society.
R. N. Sandlin, Texas State Society.
C. W. Savage, College Physical Education Association.
C. W. Savage, Ohio State Society.
Mazie V. Scanlan, New Jersey Society.
Henry J. Schnelle, Connecticut Society.
Carl P. Schott, Ph.D., West Virginia Society.
Mrs. Mary E. L. Soule, Georgia Society.
S. C. Staley, Illinois State Society.
H. T. Taylor, Kentucky State Society.
Eline von Borries, Women's Athletic Section.
Emily White, Dancing Section.
J. F. Williams, M.D., Health Education Section.
Charles C. Wilson, M.D., Public School Section.

Applications of the Objective Method of Grading Posture, Posture Standards, and the Prediction of Individual and Group Improvement*

By CHARLOTTE G. MACEWAN, ELIZABETH POWELL, and EUGENE C. HOWE

Department of Hygiene and Physical Education, Wellesley College

AN OBJECTIVE method of grading posture was described and its validity and precision discussed in the RESEARCH QUARTERLY of October, 1932. This method has been used at Wellesley College during the past four years in the routine physical examinations and to supplement special posture work. About seven thousand graded pictures are now on file. From such material it should be possible to learn something of the factors which influence posture in the physical education of college women. This paper is a presentation and discussion of some of our findings, with special reference to the relation between the posture grade at the beginning of the required work in physical education and the amount of improvement shown by the end of the freshman and sophomore years.

At Wellesley College, posture grades are obtained from photographs taken during routine physical examinations. Every freshman is examined upon entrance in September, and all freshmen and sophomores are re-examined in April. Consequently the observed posture changes of freshmen occur between September and April, and of sophomores, between April of the freshman year and April of the sophomore year. The freshman period of training in physical education during which "freshman improvement" occurs includes one sports season (six weeks) and one indoor season (eighteen weeks), while the interval for "sophomore improvement" includes two sports seasons (six weeks each), one indoor season (eighteen weeks), and the summer vacation.

During the period covered by this study, curricular work has proceeded without interruption or modification with the exception of the year 1931–32, when all instructors except those in individual gymnastics were asked to omit any special emphasis on posture other than that inherent in the activity they were teaching.

Posture photographs and objective grades are for "best standing position." No attempt has been made to determine improvement in habitual posture and carriage. The grading scale with letter grade equivalents is as follows:

* Based upon papers presented to the Research Section of the Eastern District and of the National Convention of the A.P.E.A. April, 1934.

1.5 or less $A+$	10 — 10.5 $B-$	17 — 19.5 D
2 — 4.5 A	11 — 11.5 $C+$	20 — 20.5 $D-$
5 — 5.5 $A-$	12 — 14.5 C	21 — 21.5 $E+$
6 — 6.5 $B+$	15 — 15.5 $C-$	22 — 24.5 E
7 — 9.5 B	16 — 16.5 $D+$	25 or above $E-$

The authors wish to acknowledge the work of the graduate students in this department who have written theses on various posture problems, particularly Burt in 1931, Spargo in 1932, and Kirch in 1933.

Physical educators have been tempted to ascribe special posture training virtues or adverse influences to one type of activity or another. Some have suspected that the leadership and example of the teacher, the benefit accruing from exercise in general, and the mental lift associated with the mastery of skills were the preponderant factors. Either proposition is difficult to prove. Standardization of conditions and fair sampling are not easy to achieve in any experiment which must be a part of, and not interfere with, regular curricular work.

In 1931 Burt attempted by internal statistical analysis to throw some light on the posture-training values of various activities. One of her comments was that the general improvement (during the freshman year) might be due "more to stimulation of interest through the posture grading method, changes in mental attitude, and better health habits, including regular exercise, than it is to specific activity values."[1] Examination of the data of the past four years seems to confirm this suspicion in part.

I. FRESHMEN

Various aspects of the relationship between initial grade and improvement during the freshman year are shown in Table I. Data for 1931-32 were omitted because conditions during that year were not comparable to the other three.

Note that in general, the poorer the class mean fall grade, the greater the net improvement, and the greater the percentage of students making improvement. The correlation coefficients showing the relationship between fall grade (x) and improvement (y) vary only between .599 and .687 for the separate years. For the group as a whole the coefficient is .649 $\pm$ .012 and the regression is $y = .60x - 3.8$ with a P.E.$_{est.}$ of 2.2 or 2/5 of a letter grade. When 27 activity groups are considered rather than individuals, the correlation between fall grade and improvement is found to be .960 $\pm$ .012. These groups contain 1,069 of the 1,175 individuals whose records were used in getting $r = .649$. However, the relationship between fall grade and improvement is not strictly linear. Eta_{yx} is sufficiently greater than r to establish curvilinearity.

[1] S. J. Burt, A Study of the Posture Training Values of Various Activities, Thesis, Wellesley College, 1931, p. 74.

TABLE I

POSTURE TRENDS OF FRESHMAN CLASSES

Year	1930-31	1932-33	1933-34	All 3 Years
Number of Cases	408	393	374	1175
Mean Fall Grade	12.3	10.4	10.8	10.9
Mean Net Improvement (Sept. to April)	4.0	2.3	2.1	2.8
Comparison of Fall and Spring Grades				
Improvement	80% of class	64% of class	70% of class	72% of total
No Change	9% of class	12% of class	5% of class	9% of total
Retrogression	11% of class	24% of class	25% of class	19% of total
Relation between Fall Grade (x) and Improvement (y)				
Correlation (r_{xy})	.620	.599	.687	.649
Probable error of r	.022	.022	.017	.012
Regression, $y =$	$.57x - 2.9$	$.59x - 4.0$	$.63x - 4.5$	$.60x - 3.8$
P. E. $_{est.}$	2.4	2.2	2.2	2.2
Correlation ratio (eta$_{yx}$)	.640	.600	.720	.667
Chances in 100 that relation is non-linear	95	63	98	100

A. GROUP IMPROVEMENT

The mean fall posture grade of the freshman groups in each of the activities offered in the winter term, and the mean posture improvement of these groups for the years 1930–31, 1931–32, 1932–33, and 1933–34 are shown in Fig. 1 by the squares, crosses, circles, and dots, respectively. Note that the majority of the points lie near a smooth curve, apparently indicating a definite "law" relating initial grade to improvement. When it is recalled that these points represent posture improvement for various kinds of activity groups (including individual gymnastics) under the direction of seven different instructors, the fact that the curve fits the points for the first, third, and fourth years so closely leads to the general conclusion that the major determinant of the amount of improvement to be expected at the end of a period of training is the mean posture grade of the group at the beginning of that period. Such a curve (expressed by the general equation $y = mx^n$) represents the usual relationship between initial status and improvement in any skill.[2]

Exceptions to the general trend of the curve are the groups represented by the five crosses for the year 1931–32, one of the circles for 1932–33, and three of the dots for 1933–34, which lie bunched together below the curve. It was during 1931–32 that instructors were asked to omit any special emphasis on posture, so that posture influences, good or bad, supposedly inherent in the various activities, would make themselves evident in the objective grades. This request was not made in the

[2] C. H. McCloy, *The Measurement of Athletic Power.*

case of the individual gymnastics classes. The posture improvement for this latter group conforms to the curve, whereas, as has been said, improvement for all the other groups for 1931–32 falls far below expectations. It may be logically concluded in this connection that posture instruction as an adjunct to regular class work in *any* activity is tangibly effective.

The derivation of the curve in Fig. 1 is shown by the plot of the logarithms of all the x and y values of all the points, the trend of which

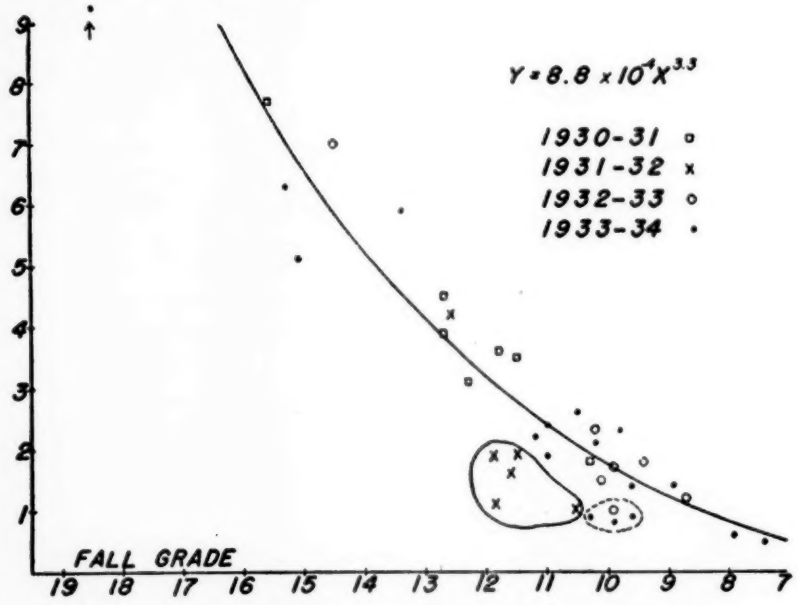


FIG. 1.—Relation between fall grade and improvement: freshman groups.

the curve is designed to represent (see Fig. 2). All the groups for 1930–31, 1932–33, and 1933–34 were included, also the individual gymnastics group in 1931–32. With the four exceptions already noted on Fig. 1, all the points fall along a rectilinear path which, considering the heterogeneous sources of the data, is rather narrowly limited. Since it is likely that some unusual irregularity was responsible for the atypical behavior of the four exceptional groups, the curve was derived from the remaining twenty-seven points. Points A and B in Fig. 2 were determined by averaging the log x and the log y values for points above and below the median of the log x values. The slope of the line AB supplies the exponent for the curve in Fig 1.

The exponential trend of the points of Fig. 1 is expressed by the equation $y = 8.8 \times 10^{-4}x^{3.3}$. It may also be expressed in terms of the correlation between the log x and the log y coordinates, $r_{\log \times \log y} = .962 \pm$

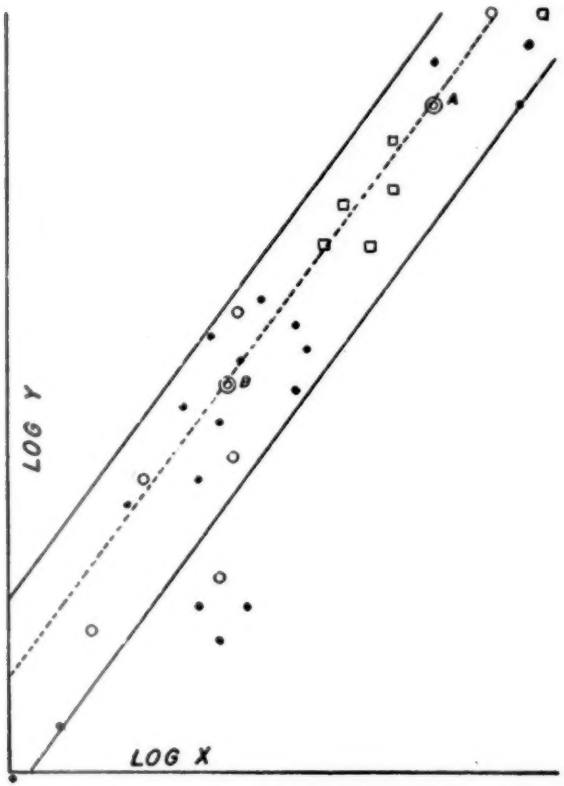


FIG. 2.—Relation between logarithms of fall grade and logarithms of improvement: freshman groups.

.012. Furthermore, since $\log y = 3.3 \log x + \log (8.8 \times 10^{-4})$, the equation of the regression line, we have here a means of rectilinear prediction of $\log y$ from $\log x$, and consequently of y from x.[3] The use of the logarithmic function and the probable error of estimate (*sigma* log y times $\sqrt{1 - r^2}$ times .6745) which in this case is .05699, makes it possible to determine the precision of prediction from a curve. The logarithm for a given initial grade ($\log x$) is used to compute the logarithm of improvement ($\log y$) by means of the linear regression. This computed value, increased and diminished by $P.E._{est.}$ of $\log y$, gives the limits of precision for that prediction. The antilogarithms of a series of such values define the upper and lower limits of the $P.E._{est.}$ of predicted improvement (y) for corresponding fall grades (x) (see Fig. 3).

The log graph of Fig. 1, if provided with parallel $P.E._{est.}$ zones would be a more workmanlike expression of the relation between fall grade and

[3] G. U. Yule, *An Introduction to the Theory of Statistics*, p. 202.

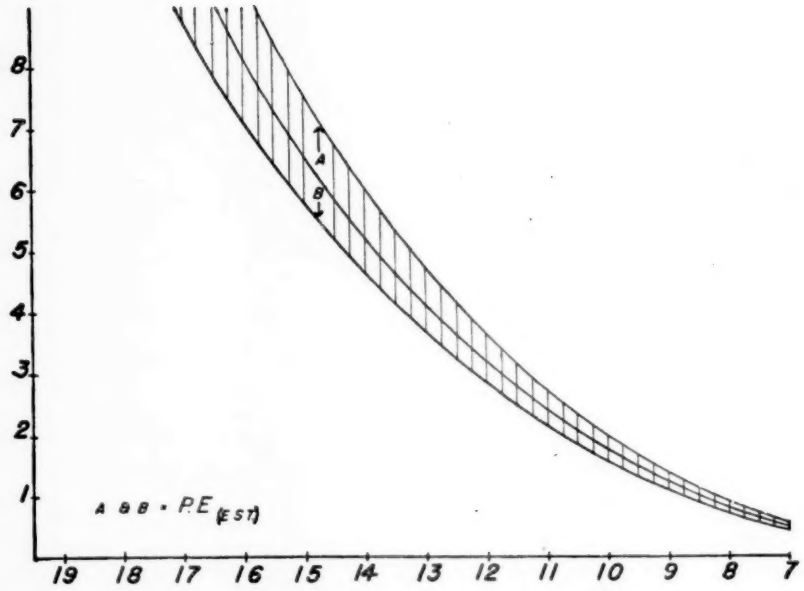


FIG. 3.—Probable error of estimate zone for freshman group prediction curve.

improvement, but since the graph is intended ultimately to be used for instructional purposes, it has been thought best to leave it in the more easily comprehended curvilinear form.

Since the curve $y = 8.8 \times 10^{-4}x^{3.3}$ with its $P.E._{est.}$ zone is based on the data of three comparable and typical years and upon a very fair sample of Wellesley College freshmen, it may be taken as a tentative norm for evaluating the posture improvement of various groups of students. Although small classes should follow the trend of the curve, chance and determinant factors will cause them to scatter somewhat from the path of the curve. An improvement identical with that called for by the curve for a given fall grade may be scored as *par*. Credit or debit for achievement above or below par may then be indicated in tenths of $P.E._{est.}$ units which for convenience will be called PAU's, Posture Achievement Units.

Values of x, y, tenths of $P.E._{est.}$ or PAU's and $x - y$ for freshman activity groups appear in Table II. The predicted improvement, the variability to be expected, and the predicted spring grade are given for a series of fall grades. A complete tabulation of this kind is used in making predictions.

For example a class having a mean fall grade of 13 should improve 4.2 points according to the table. Reaching this amount of improvement, the class would be scored a par of 50. But suppose the class improvement was 5.3 which is 1.1 above par. The PAU above par for an initial

TABLE II
POSTURE PREDICTION FOR FRESHMAN GROUPS

Fall Grade (x)	Predicted Improvement (y)	$P.E._{est.} \div 10 =$ PAU Above par	Below par	Predicted Spring Grade ($x - y$)
7.0 *B*	.5	.01	.01	6.5 *B+*
8.0 *B*	.8	.01	.01	7.2 *B*
9.0 *B*	1.2	.02	.02	7.8 *B*
10.0 *B—*	1.8	.03	.02	8.2 *B*
11.0 *C+*	2.4	.03	.03	8.6 *B*
12.0 *C*	3.2	.05	.04	8.8 *B*
13.0 *C*	4.2	.06	.05	8.8 *B*
14.0 *C*	5.3	.07	.06	8.7 *B*
15.0 *C—*	6.7	.09	.08	8.3 *B*
16.0 *D+*	8.3	.12	.10	7.7 *B*
17.0 *D*	10.1	.14	.12	6.9 *B+*

grade of 13 is .06. Therefore the achievement score would be 1.1 divided by .06 which equals 18 PAU's above par or 68 PAU's. Failing to reach par, with an improvement of only 4.0 (.2 below par), its achievement score would be —.2 divided by .05 which equals 4 PAU's below par or 46 PAU's. Thus both teacher and class would have a tangible posture objective and a means of evaluating and comparing the achievement of groups.

Table III shows posture achievement scores in PAU's and the number of students enrolled for the various activity groups in each of the four years, and also the averages for the three comparable years. The fundamental gymnastics groups maintain rather high scores consistently although the highest score in any given year is made by some other activity. Variability may be due in part to smaller enrollments in these other activities. But since there is such variability from year to year we are not justified in concluding that the posture training values of activities correspond to their ranking even on the basis of the three-year average.

TABLE III
POSTURE ACHIEVEMENT SCORES OF FRESHMEN GROUPED ACCORDING TO ACTIVITY

Activity	1930-31 PAU'S	No.	(1931-32)* PAU'S	No.	1932-33 PAU'S	No.	1933-34 PAU'S	No.	3 Yr. Ave. PAU'S	No.
Fundamental Gym ..	62	209	(7	212)	50	227	50	114	54	550
The Modern Dance	62	35	(13	20)	60	16	40	104	54	155
Individual Gym	51	40	(58	48)	63	35	41	49	52	124
Folk Dancing	68	30	(20	16)	15	22	73	8	52	60
Riding	40	10	(—80	4)	70	5	17	4	42	19
Tap Dancing	47	40	(17	59)	63	31	5	53	38	124
Restricted Gym	50	44	(0	48)	5	57	53	42	36	143

* During this year all instructors except those in individual gymnastics were asked to omit any special emphasis on posture other than that inherent in the activity they were teaching.

Table IV shows posture achievement scores in PAU's and the number of students enrolled with the various instructors. These scores serve as a measure of the instructor's achievement. However, small differences in ranking are not to be considered significant, particularly in view of the great variability of a given instructor's score from year to year.

TABLE IV

POSTURE ACHIEVEMENT SCORES OF FRESHMEN GROUPED ACCORDING TO INSTRUCTOR

Instructor	1930-31 PAU's	No.	(1931-32)* PAU's	No.	1932-33 PAU's	No.	1933-34 PAU's	No.	3 Yr. Ave. PAU's	No.
A.....	62	209	(17	152)	70	113	57	36	63	358
B.....	56	74	(20	16)	..	..	..	..	56	74
C.....	62	35	(13	20)	60	16	40	104	54	155
D.....	51	40	(58	48)	63	35	41	49	52	124
E.....	..	..	(2	153)	45	183	40	147	43	330
F.....	40	10	(—80	4)	70	5	17	4	42	19
G.....	47	40	(37	14)	57	19	20	23	41	82
H.....	..	..	..	..	25	22	50	11	38	33

* During this year all instructors except those in individual gymnastics were asked to omit any special emphasis on posture other than that inherent in the activity they were teaching.

When the curve of Fig. 1 is replotted to show the relationship between fall and spring grades it will be seen (Fig. 4) that groups starting from either the poor or the good end of the x scale are predicted

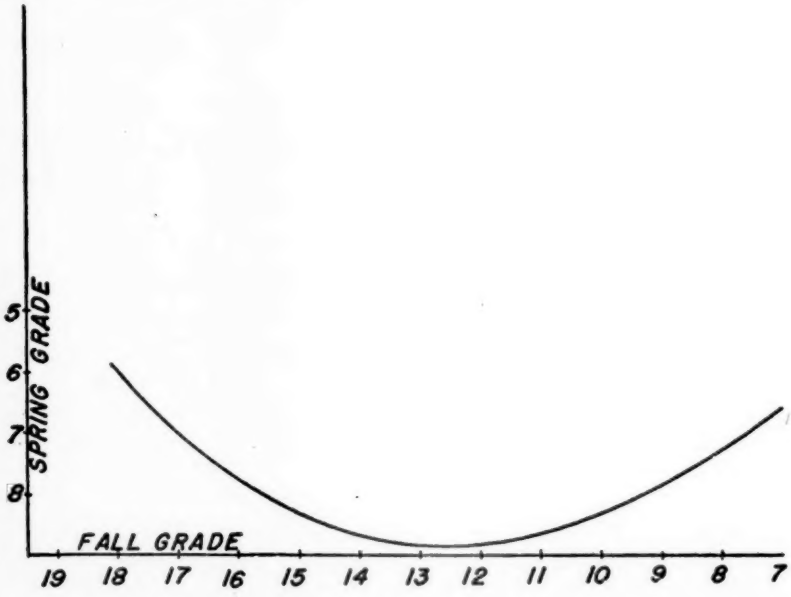


FIG. 4.—Relation between fall and spring grades: freshman groups.

to reach a better spring grade than are groups starting in the middle. It would appear that the average group gets less attention and has less ambition than those that are either very good or very poor.

B. Individual Improvement

A study similar to the preceding was made of the improvement of individuals in the freshman classes of the three comparable years. When fall grade was plotted against the mean improvement for each posture grade class in the scattergrams, it was found that a large proportion of those having a fall grade of six or better made negative improvement (i.e., Line I, Fig. 5 extends below zero). This apparent unfavorable effect of the physical education program on students with initially satisfactory posture grades is brought out clearly by the following summary

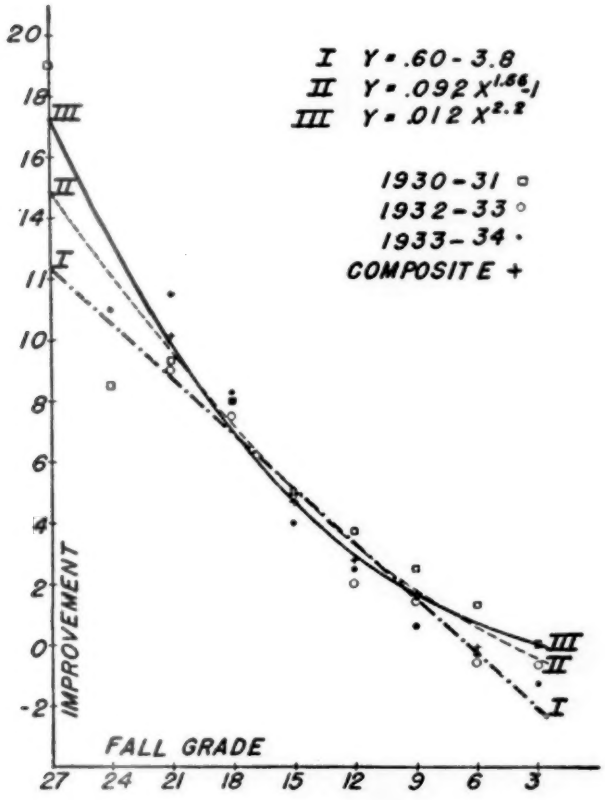


Fig. 5.—Relation between fall grade and improvement: freshman individuals.

of the data from the freshman class of the year 1930-31. The percentage of zero or negative improvement was:

60% of those with a fall grade of *A*
28% of those with a fall grade of *B*
14% of those with a fall grade of *C*
3% of those with a fall grade of *D*
0% of those with a fall grade of *E*

A special study is now being carried on with the express purpose of investigating this situation and explaining the slump generally occurring among students who enter with excellent posture grades.

The various correlation coefficients and regression equations for the three classes and for the composite group were summarized in Table I. The regression $y = .60x - 3.8$, $P.E._{est.}$ 2.2, provides a means of predicting individual improvement with an even chance that the error will not be more than 2/5 of a letter grade (see Line I, Fig. 5).

As might be expected from the behavior of the freshman groups and from the fact that *eta* is significantly greater than *r*, a curve (obtained as described above for activity groups) comes closer to "fitting" all the data than the regression line (compare I and II, Fig. 5). On the basis of this curve, negative improvement will be predicted for individuals with initial grades of 5 or better. This retrogression may be due in part to the tendency of superior and self-conscious individuals to appear to conform to the style standard of the class average, and in part to the damage that is often done when attempts are made to improve a naturally good coordination by conventional coaching. From a pedagogical point of view, and because it is believed that the high ratio of retrogression among those with very good starting grades may be appreciably reduced, it was thought wise to avoid the prediction of negative improvement. So another curve was computed, omitting data for fall grades 3 and 6. The result was Curve III, Fig. 5 with the equation $y = .012x^{2.2}$. The precision of the prediction from this curve was determined via the rectilinear relationship of logarithms as was described for the group prediction curve.

Table V shows a series of values based on Line III, Fig. 5 for fall

TABLE V
POSTURE PREDICTION FOR INDIVIDUAL FRESHMEN

Fall Grade (x)	Predicted Improvement (y)	$P.E._{est.} \div 10$ = PAU Above par	PAU Below par	Predicted Spring Grade ($x - y$)
3.0 *A*	.1	.22	.19	2.9 *A*
6.0 *B*+	.6	.23	.20	5.4 *A*−
9.0 *B*	1.5	.25	.21	7.5 *B*
12.0 *C*	2.9	.28	.23	9.1 *B*
15.0 *C*−	4.7	.31	.26	10.3 *B*−
18.0 *D*	7.1	.35	.30	10.9 *C*+
21.0 *E*+	9.9	.41	.34	11.1 *C*+

grade (x), predicted improvement (y), PAU's, and the predicted spring grade (x-y). Spring grades for individual freshmen can be quickly predicted by referring to a complete tabulation of this kind.

II. SOPHOMORES

A full report of posture changes in the sophomore year cannot be made at the present time. The increment of improvement during the freshman year and other undetermined factors tend to decrease or obscure the relationship between initial grade and improvement.

SUMMARY

1. The posture improvement of individuals and groups is, for the most part, a function of the posture grade at the beginning of the period of instruction—a relationship which is more significant for freshmen than for sophomores.

2. Posture instruction as an adjunct to regular class work in any physical education activity is tangibly effective.

3. The superiority of one activity over another as a means of improving posture is not demonstrated. There is even less evidence that the personality and example of the instructor, or the method of teaching is of consequence in affecting improvement.

4. It is suggested that the exponential curves representing the relationship between fall grade and freshman improvement be used as par objectives of class or individual progress, and that improvement be evaluated in terms of a sliding scale of Posture Achievement Unit deviations from par.

5. The analysis of posture trends supplies information which may lead to the investigation of discrepant instances of posture improvement and to increased effectiveness in posture training.

Achievement Scales in Physical Education for College Women

By Frederick W. Cozens
and Hazel J. Cubberley
Departments of Physical Education,
University of California at Los Angeles

BEFORE an attempt can be made to set up achievement scales in physical education activities for college women it is necessary to determine the influence of the factors of age, height, and weight upon performance.

It has already been found[1] that the best possible classification scheme for elementary school girls, taking into consideration the factors of age, height, and weight, is:

2 Age (in years) + .55 Height (in inches) + .11 Weight (lbs).

For secondary school girls only, the best classification weighting seems to be:[2]

2 Age (in years) + Height (in inches) + .11 Weight (lbs).

It should be pointed out, however, that for secondary school girls the relationship between the combined factors of age, height, weight, and performance is very much lower than for elementary school girls and that the highest multiple correlation coefficient for any single event and the combination of factors will probably never be higher than $R = .400$. An analysis of the performance records of junior and senior high school girls indicates that the average age, height, and weight after which skill remains at a "stand-still" is 15½ years, 66 inches, and 135 pounds.

It is quite logical, then, to assume that for college women, the factors of age, height, and weight have little, if any, effect upon performance ability. In order to prove this assumption, an unselected group of four hundred college women at the University of California at Los Angeles was given a battery of six tests including the following: Basketball Throw for Distance, Baseball Throw for Distance (twelve-inch playground ball), Jump and Reach, Run and Catch, Baseball Throw for Accuracy, and Dodging (or Maze) Run.[3] The correlation

[1] Frederick W. Cozens and N. P. Neilson, "Age, Height, and Weight as Factors in Classifying Elementary School Children," *Jr. Health and Phys. Educ.*, III: 10 (December, 1932), 21, 58.

[2] Unpublished study, Frederick W. Cozens.

[3] The writers wish to express their appreciation for the cooperation given them in the collection of data by Miss Edith I. Hyde and Mrs. Marjorie Gould Allen of the Department of Physical Education for Women, University of California at Los Angeles, and to the many major students who have assisted in a variety of ways.

coefficients between performance records and the factors of age, height, and weight are shown in Table I.

TABLE I

SHOWING CORRELATION COEFFICIENTS BETWEEN PERFORMANCE RECORDS AND THE FACTORS OF AGE, HEIGHT, AND WEIGHT.
400 COLLEGE WOMEN.

Event	Mean	Standard Deviation	Correlation Coefficients Age	Height	Weight
Baseball Throw—Accuracy	47.15	15.90	.179	.032	.052
Baseball Throw—Distance	85.3′	23.5′	.143	.092	.172
Basketball Throw—Distance	48′7″	11.11′	.152	.147	.197
Dodging Run	26.00s	1.55s	.129	.001	—.043
Jump and Reach	13.30″	2.42″	.039	.084	—.097
Run and Catch	20.00s	2.00s	.196	.074	.064
Age	19.4 yrs.	1.74 yrs.	—	—.012	—.012
Height	64.4″	2.32″	—.012	—	.496
Weight	124.7 lbs.	26.8 lbs.	—.012	.496	—

The following conclusions agree closely with a previous study:[4]

1. The factors of age, height, and weight have almost a negligible effect upon performance in a variety of athletic achievement tests for college women. The tests include speed in running, ability to throw for distance and accuracy, ability to jump, and ability to run and catch.

2. Correlation coefficients between basketball throw and the factors of height and weight agree almost exactly in the two studies.

3. College women represent a homogeneous group and in achievement scales set up for them only one performance classification or grouping is necessary.

As a check on conclusion No. 1 above, another method of showing differences in various height-weight groups was tried. The distributions for both height and weight for each event were divided into three parts, the upper 25 per cent, the middle 50 per cent, and the lower 25 per cent. Average performances for each of the height groups and for each of the weight groups in all events were then computed with results as shown in Table II.

While differences between mean performances of the various height and weight groups exist in the basketball and baseball throws for distance, differences in mean performance in the other events are not evident. It would not be practical, therefore, to group college women according to height-weight groups in one type of activity and not in other types. Consequently, achievement scales for only one grouping are desirable.

[4] A. Viola Mitchell, "A Scoring Table for College Women in the Fifty-Yard Dash, the Running Broad Jump, and the Basketball Throw for Distance," *Supplement to Res. Quart. Am. Phys. Ed. Assoc.*, V: 1 (March, 1934), 86–91.

Achievement scales together with descriptions of events and rules for conducting the tests in this experiment are shown herewith. In every case, the scales represent a performance range of three standard deviations on each side of the mean and are set up in such a way that a score of 50 represents mean performance, one of 100 a performance level at three standard deviations above the mean, and a zero score the performance level at three standard deviations below the mean. Thus, each performance increment above or below the mean will be the total range (6σ) divided by 100.

TABLE II

SHOWING MEAN PERFORMANCES IN EACH OF THREE HEIGHT AND WEIGHT GROUPS*

Event	Height Group			Weight Group		
	Upper 25%	Middle 50%	Lower 25%	Upper 25%	Middle 50%	Lower 25%
Baseball Throw—Accuracy (in points)	46.85	47.66	45.74	47.86	47.22	46.67
Baseball Throw—Distance (in feet)	88.55	81.85	86.68	91.70	85.20	79.75
Basketball Throw—Distance (in feet)	50.10	47.29	48.20	52.23	48.32	44.76
Dodging Run (in seconds and tenths)	26.21	25.86	26.18	26.02	26.01	25.94
Jump and Reach (in inches)	13.76	13.16	13.13	13.01	13.50	13.11
Run and Catch (in seconds and tenths)	19.57	20.23	19.84	19.83	19.86	20.20

* The use of the standard error of difference formula on the various differences shows that the only significant differences are as follows: Basketball Throw for Distance—between upper 25 per cent and lower 25 per cent of the weight groups; Baseball Throw for Distance—between upper 25 per cent and lower 25 per cent of the weight groups.

TEST DESCRIPTIONS AND RULES

I. PLAYGROUND BASEBALL THROW FOR ACCURACY

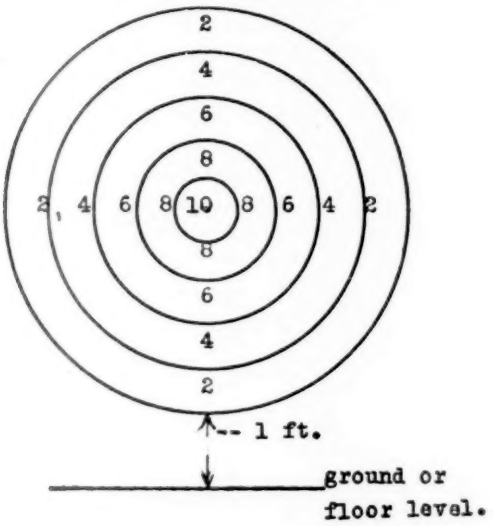
(Overhand Throw)

Equipment Needed.—One or more targets painted on an outside wall or handball court. Make five concentric circles one foot, two feet, three feet, four feet, and five feet in diameter. The center of all circles is three feet, six inches from the ground or floor. The outside circle is one foot from the ground. In determining the diameter of each circle include the width of the line.

A throwing line three feet long is established thirty-five feet from the target.

A number of twelve-inch outseam playground balls.

Description.—The contestant stands on the throwing line. One foot must be in contact with the throwing line at the time the ball is released. The other foot may be ahead of the line. The free overhand throw must be used. Counting from the center outward the circles score 10-8-6-4-2. Any throw hitting outside the large circle shall be recorded as zero. Throws hitting the line between two zones score for the inside zone.



Rules.—1. The contestant's score shall be the total number of points she can make in ten throws at the target from thirty-five feet.

2. The ten throws must be taken in succession.

3. Two trials of ten throws each shall be allowed and the best record circled as the contestant's achievement score.

II. PLAYGROUND BASEBALL THROW FOR DISTANCE

(Twelve-inch outseam ball)

Equipment Needed.—With groups of ten, five new twelve-inch outseam playground balls or five balls in good condition should be used.

A field lay-out as shown below. Other means of measurement may be used but the one suggested will provide an easy means of administration.

Description.—Five pairs of throwers, each provided with a ball, are allowed one minute in which to warm up their arms. They are then grouped around the examiner for the following explanation: "The field is lined off and marked so that it is possible to throw from both ends. Each contestant must remain behind the restraining line when the throw is made. A fifteen-foot run is allowed. The markers on the right

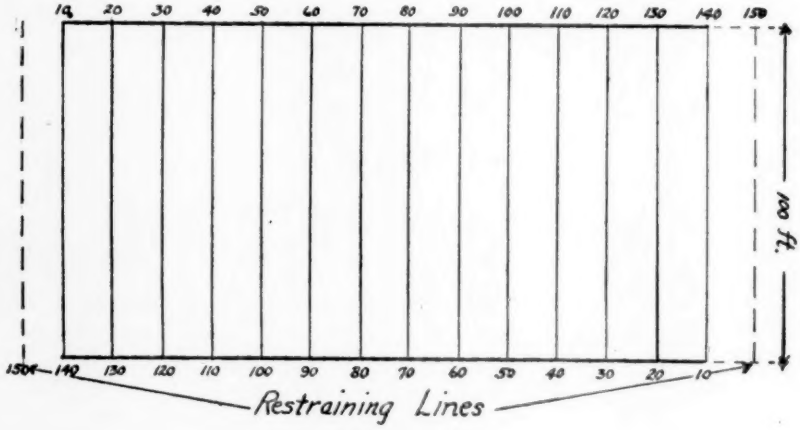
of the receiver indicate the distance the thrower has made to the nearest ten-foot interval. The receiver should catch the ball on the first bounce and then call out the distance to the thrower, estimating to the nearest foot the spot where the ball first hits the ground."

After each pair has had three throws, that pair reports to the examiner the best throw of each individual. Each pair brings in the ball when the report is made. While the throwing is in progress, the examiner stands at the side of the field supervising the test.

Rules.—1. The throws shall be recorded in feet as the distance from the restraining line to the point where the ball first lands, thus, 82 for eighty-two feet. Estimations need be made only to the nearest foot.

2. The contestant is not permitted to step over the restraining line.

3. Only three throws for distance are allowed. The best of these shall be circled as the contestant's achievement record.



FIELD LAY-OUT

III. BASKETBALL THROW FOR DISTANCE

Equipment Needed.—One or more well-inflated regulation inseam basketballs.

One or more field lay-outs as shown below.

Description.—The basketball is thrown for distance from a six-foot circle with any type of throw desired. However, the round-arm, overhand type of throw is suggested and demonstrated as lending itself to the greatest distance.

The field lay-out may be described as follows: Use the six-foot center circle on a basketball court or draw and mark with lime a circle of six feet in diameter. Using an angle of approximately thirty degrees at the circle, mark out straight lines from the center of the circle outward to a distance of eighty-three feet. Beginning at thirty feet from

the circumference of the circle, lay off arcs cutting the sector lines at intervals of ten feet.

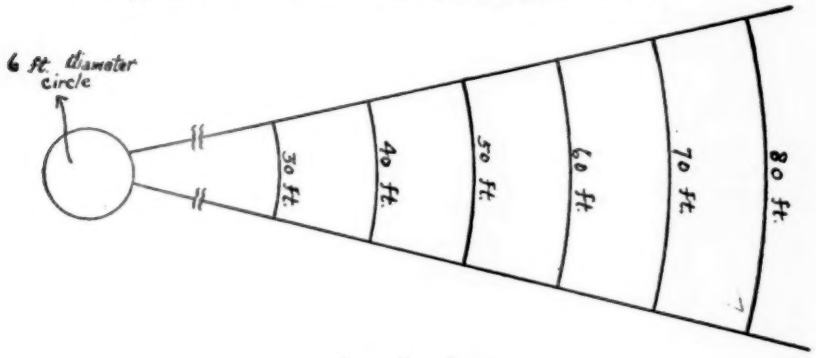
By standing in the field, the examiner can estimate throws to the nearest foot very accurately and thus eliminate much loss of time.

Contestants shall be allowed several throws to warm-up their arms.

Rules.—1. The throws shall be recorded in feet as the distance from the inside edge of the circle to the point nearest the circle where the ball first lands, thus, 54 for fifty-four feet. Estimations need be made only to the nearest foot.

2. Fouls shall be:

a) Stepping on or outside of the circle during the throw.



FIELD LAY-OUT

b) Leaving the circle before the contestant's balance has been recovered.

3. Foul throws shall not be measured but shall constitute a trial.

4. Three throws shall be allowed and the best of these shall be circled as the contestant's achievement record.

IV. DODGING RUN

Equipment Needed.—A field lay-out as shown below and five low hurdles.

Description.—This event is designed to measure not only "speed of legs" but ability to change direction quickly, a quality that is extremely important in all types of athletic endeavor—basketball, hockey, tennis, speedball, and the like.

In the field lay-out shown below the runner starts at point "*A*," follows the course indicated by the dotted lines and returns to point "*A*," circles that hurdle, and repeats the run ending finally at point "*A*." In other words, the run involves two complete round trips.

Parallel lines or lanes three feet wide are laid out and low hurdles placed as shown in the lay-out. The surface for this test should be asphalt or its equivalent.

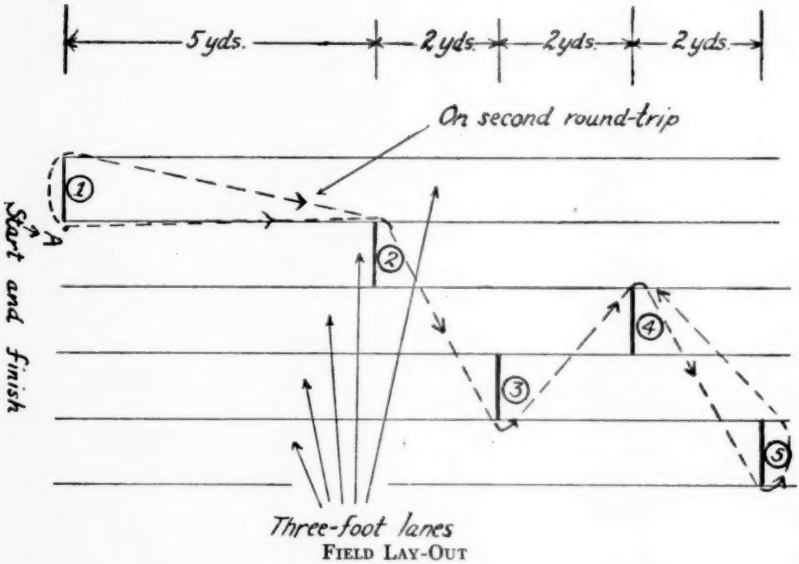
For purposes of warming-up and to give the contestants an idea of

the turns, each contestant should be required to trot through the entire run before attempting to run for time.

Rules.—1. Time shall be taken from the word "Go" until the runner crosses the finish line and shall be recorded in seconds and tenths as the contestant's achievement score, thus, 23.4 for twenty-three and four-tenths seconds.

2. The contestant must not take hold of the hurdles as she rounds them. If the contestant bumps against a hurdle, she continues her run. The instructor should have the hurdle replaced quickly.

3. At the end of the first round trip, the hurdle at "*A*" may be circled in any manner, that is, with the right side toward the hurdle or



FIELD LAY-OUT

with the left side toward it. After passing hurdle No. 2 for the last time on the second round trip, the contestant should run directly past point "*A*."

4. Two trials shall be allowed with sufficient rest between trials. If the contestant gets off on the wrong path, the instructor should stop her and allow another trial when she has rested.

V. JUMP AND REACH

Equipment Needed.—A smooth wall inside or outside—board, brick, or cement. The post of an outside basketball court may be used.

A number of pieces of chalk not more than one-half inch in length.

One or more yard sticks.

Description.—The contestant stands facing the wall with toes touching the wall and with both feet flat on the floor or ground. Reaching

upward as far as possible with her right hand and with forearm and wrist against the wall, she makes a chalk mark on the wall. From a standing position with her side to the wall she then jumps into the air as high as possible and makes another mark above her first one. This jumping procedure is then repeated five times with a few seconds rest between jumps.

In measuring it is important to place the zero end of the yard stick at the upper mark to avoid errors in reading the distance jumped.

Rules.—1. The score shall be recorded as the distance between the contestant's reach and her best jump to the nearest half-inch, thus, 12½ for twelve and one-half inches. Any jump less than three-quarters but one-quarter or more shall be recorded as a half. Any jump three-quarters or more but less than one-quarter shall be recorded as the even inch.

2. No run is allowed. Contestant may dip for the jump but no bouncing is permitted. Reach as high as possible for the first chalk mark—forearm and wrist must be against the wall.

3. Five trials *may* be allowed.

VI. RUN AND CATCH

Equipment Needed.—One or more regulation basketballs.

Cord stretched ten feet high between two posts. Cord should be at least ten feet long. There must be no sag in the cord.

Starting line thirty feet from cord. Cord may be stretched between rims ot basketball goals.

Description.—At the command "Get Ready," the contestant stands erect back of the starting line. At a signal the contestant, with the ball in her possession, runs from the starting line to a point just beyond the cord, tosses the basketball over the cord (toward the starting line), catches it, and runs back to touch the starting line with the ball. Three such trips are made finishing at the starting line by merely running across it without touching the ball to the line.

In case of failure to catch the ball, the contestant should be stopped and a retrial given.

Rules.—1. Time shall be taken from the signal "Go" to the instant the contestant crosses the starting line after the third catch. Record time in seconds and tenths, thus, 21.6 for twenty-one and six-tenths.

2. On the first and second returns the contestant must touch the starting line with the ball. On the last return the contestant must cross the line as if finishing a run.

3. Two trials should be allowed and the best record circled.

Score	Baseball Throw—Accuracy *Target value*	Baseball Throw—Distance *Feet*	Basketball Throw—Distance *Feet and inches*	Dodging Run *Seconds and tenths*	Jump and Reach *Inches*	Run and Catch *Seconds and tenths*	Score
100		156	81-11		20½	14.0	100
99	94	154	81-3	21.4		14.1	99
98		153	80-7	21.5		14.2	98
97	92	152	79-11	21.6		14.4	97
96		150	79-3	21.7	20	14.5	96
95	90	149	78-7	21.8		14.6	95
94		147	77-11	21.9		14.7	94
93	88	146	77-3	22.0	19½	14.8	93
92		145	76-7	22.1		15.0	92
91	86	143	75-11	22.2		15.1	91
90		142	75-3	22.3		15.2	90
89	84	140	74-7	22.4	19	15.3	89
88		139	73-11	22.5		15.4	88
87	82	137	73-3	22.6		15.6	87
86		136	72-7		18½	15.7	86
85		135	71-11	22.7		15.8	85
84	80	133	71-3	22.8		15.9	84
83		132	70-7	22.9		16.0	83
82	78	130	69-11	23.0	18	16.2	82
81		129	69-3	23.1		16.3	81
80	76	128	68-7	23.2		16.4	80
79		126	67-11	23.3	17½	16.5	79
78	74	125	67-3	23.4		16.6	78
77		123	66-7	23.5		16.8	77
76	72	122	65-11	23.6	17	16.9	76
75		121	65-3	23.7		17.0	75
74	70	119	64-7	23.8		17.1	74
73		118	63-11	23.9		17.2	73
72	68	116	63-3	24.0	16½	17.4	72
71		115	62-7			17.5	71
70	66	114	61-11	24.1		17.6	70
69		112	61-3	24.2	16	17.7	69
68	64	111	60-7	24.3		17.8	68
67		109	59-11	24.4		18.0	67
66	62	108	59-3	24.5		18.1	66
65		106	58-7	24.6	15½	18.2	65
64	60	105	57-11	24.7		18.3	64
63		104	57-3	24.8		18.4	63
62		102	56-7	24.9	15	18.6	62
61	58	101	55-11	25.0		18.7	61
60		99	55-3	25.1		18.8	60
59	56	98	54-7	25.2		18.9	59
58		97	53-11	25.3	14½	19.0	58
57	54	95	53-3			19.2	57
56		94	52-7	25.4		19.3	56
55	52	92	51-11	25.5	14	19.4	55
54		91	51-3	25.6		19.5	54
53	50	90	50-7	25.7		19.6	53
52		88	49-11	25.8		19.8	52
51	48	87	49-3	25.9	13½	19.9	51

ACHIEVEMENT SCALES—COLLEGE WOMEN (Continued)

Score	Baseball Throw—Accuracy *Target value*	Baseball Throw—Distance *Feet*	Basketball Throw—Distance *Feet and inches*	Dodging Run *Seconds and tenths*	Jump and Reach *Inches*	Run and Catch *Seconds and tenths*	Score
50		85	48-7	26.0		20.0	50
49	46	84	47-11	26.1		20.1	49
48		82	47-3	26.2	13	20.2	48
47	44	81	46-7	26.3		20.4	47
46		80	45-11	26.4		20.5	46
45	42	78	45-3	26.5		20.6	45
44		77	44-7	26.6	12½	20.7	44
43	40	75	43-11			20.8	43
42		74	43-3	26.7		21.0	42
41	38	73	42-7	26.8	12	21.1	41
40		71	41-11	26.9		21.2	40
39	36	70	41-3	27.0		21.3	39
38		68	40-7	27.1	11½	21.4	38
37	34	67	39-11	27.2		21.6	37
36		66	39-3	27.3		21.7	36
35		64	38-7	27.4		21.8	35
34	32	63	37-11	27.5	11	21.9	34
33		61	37-3	27.6		22.0	33
32	30	60	36-7	27.7		22.2	32
31		59	35-11	27.8	10½	22.3	31
30	28	57	35-3	27.9		22.4	30
29		56	34-7			22.5	29
28	26	54	33-11	28.0		22.6	28
27		53	33-3	28.1	10	22.8	27
26	24	51	32-7	28.2		22.9	26
25		50	31-11	28.3		23.0	25
24	22	49	31-3	28.4	9½	23.1	24
23		47	30-7	28.5		23.2	23
22	20	46	29-11	28.6		23.4	22
21		44	29-3	28.7		23.5	21
20	18	43	28-7	28.8	9	23.6	20
19		42	27-11	28.9		23.7	19
18	16	40	27-3	29.0		23.8	18
17		39	26-7	29.1	8½	24.0	17
16	14	37	25-11	29.2		24.1	16
15		36	25-3	29.3		24.2	15
14	12	35	24-7			24.3	14
13		33	23-11	29.4	8	24.4	13
12		32	23-3	29.5		24.6	12
11	10	30	22-7	29.6		24.7	11
10		29	21-11	29.7	7½	24.8	10
9	8	27	21-3	29.8		24.9	9
8		26	20-7	29.9		25.0	8
7	6	25	19-11	30.0	7	25.2	7
6		23	19-3	30.1		25.3	6
5	4	22	18-7	30.2		25.4	5
4		20	17-11	30.3		25.5	4
3	2	19	17-3	30.4	6½	25.6	3
2		18	16-7	30.5		25.8	2
1		16	15-11	30.6		25.9	1

The Response of the Heart to Water of Swimming Pool Temperature

By W. W. TUTTLE
Department of Physiology, State University of Iowa
and JOHN F. CORLEAUX
Cape Girardeau, Missouri

THE POPULARITY of swimming, both as recreation and as a competitive sport, has stimulated considerable research concerning the effects on the physiological responses of the various body mechanisms, produced by changing from air to water. Where exercise is involved, one of the first things generally considered is the response of the heart to the situation. Perhaps the majority of those who dive into the swimming pool fail to realize that they are not only enjoying a beneficial exercise but also experiencing cardiac rest by merely being in the water.

In order to establish the facts relative to just how the heart responds to submersion in water at the usual swimming pool temperatures, the experiment herein reported was carried out.

It is a well established fact that submersion in water results in altered functioning of a number of the systems of the body. In fact, the clinician makes use of water of various temperatures as a means of therapy in treating various diseases. As a result of the work of Hill and Flack,[1]* Bazett,[2] Strasburger,[3] Welti-Kettiger,[4] Kellogg,[5] and Wells,[6] it has been proven that cold water decreases the heart rate, while hot water increases it. A water bath of approximately body temperature is considered neutral.

The fact that the University of Iowa possesses a large well regulated swimming pool, in which large numbers of individuals swim daily, provided an ideal situation for conducting an experiment of this nature.

An investigation of the environment around the pool showed that the relative humidity varied from 75 to 98 per cent, with a temperature varying from 80° to 90° F. Since the experimental work was all carried out in this environment, the heart rates reported as normal are not meant to be comparable to the figures usually accepted.

The Technique.—The experimental subjects consisted of a group of one hundred men and boys ranging in age from twelve to thirty-nine years. Since the object of the experiment was to establish a true concept concerning the response of the heart of individuals in general to the water in the pool, no attempt was made to control factors such as size, pool temperature, room temperature, humidity, etc. By omit-

* Numbers refer to the bibliography.

ting such procedures it was felt that a truer picture of heart response could be obtained.

The swimming pool used in the experiment is 60′ x 150′ and is provided with running water which is sufficiently chlorinated to control any bacteria which might be present.

Each subject came to the swimming pool, stripped, and seated himself in easy access to the water. The individual remained seated until his heart rate established itself at a uniform rate. Sitting pulse was then taken, the count being made for one minute. Following this, the subject assumed a standing position. The process of counting the pulse was repeated, as in sitting, and the rate recorded.

After the establishment of normal sitting and standing heart rates, the subject was seated in the pool with only his head above the water. Heart rate was established as previously described. The heart rate was then taken for the subject in a standing position in the pool. Here again, only the head was exposed. The heart rate was counted by the use of a stethoscope placed over the apex of the heart, and time was measured by a stop-watch.

THE DATA

Data were collected from one hundred male subjects and eleven varsity swimmers as described above. The data show the following:

	Mean normal pulse rate	*Mean pulse rate in pool*	*Difference*
Sitting	87	76	11
Standing	98	84	14

The data show that in both the sitting and standing position, there was a decided decrease in pulse rate.

In addition, data were collected from eleven members of the varsity swimming squad in order to determine whether or not frequency of exposure had a compensatory effect on the response of the heart to water of swimming pool temperature. The results were as follows:

	Mean normal pulse rate	*Mean pulse rate in pool*	*Difference*
Sitting	75	69	6
Standing	85	76	8

It is obvious that the varsity swimmers also experienced a decrease in pulse rate in both the sitting and standing position.

DISCUSSION

The first point of interest to both instructors and those who frequent swimming pools is that one can expect a decrease in heart rate ranging from 2 to 40 beats per minute. A study of the data shows that the decrease in rate experienced depends on the initial rate, since the fall is directly proportional to it. The normal sitting pulse range was from 120 beats per minute for a 14-year-old boy to 56 per minute for a 24-year-old man. The former experienced a decrease of 40 beats

per minute when sitting in the pool, while the latter had a decrease of only 2 beats.

The data relative to the factor of compensation due to the frequency of submersion might lead one to believe that the varsity swimmer's heart has adjusted itself, somewhat, to the water. However, this is probably not so, since the initial heart rate of the swimmers was significantly lower than that of the non-swimming group.

The effect of the conditions surrounding the swimming pool can be summarized by stating that factors such as humidity and temperature, which cause a change in the initial heart rate, also alter the effects of the water in the pool.

On the basis of the work of other investigators, it is apparent that the controlling factor for the change in heart rate due to submersion in swimming pools is the temperature of the water. As a rule swimming pool temperatures are far below the neutral point (37° C), and thus those frequenting them experience a fall in heart rate.

CONCLUSIONS

On the basis of data collected from one hundred individuals picked at random and eleven varsity swimmers, the following conclusions are drawn:

1. Submersion in water of the ordinary swimming pool temperature causes a decrease in the heart rate.

2. The extent of the decrease in heart rate due to submersion is directly proportional to the initial rate.

3. Those who continuously frequent swimming pools, such as varsity swimmers, experience a cardiac reaction similar to non-swimmers. This is evidence that there is no compensation mechanism for the decrease in heart rate caused by submersion in water of swimming pool temperatures.

BIBLIOGRAPHY

1. Hill, L., and Flack, M. "The Influence of Hot Baths on Pulse Frequency, Blood Pressure, Body Temperature, Breathing Volume, and Alveolar Tensions of Man." *J. of Physiol.*, 38 (1909), lvii–lxi.
2. Bazett, H. C. "Studies on Effects of Baths on Man; Relationships Between Effects Produced and Temperature of Bath." *Am. J. Physiol.*, 70 (1924), 412–429. Bazett, H. C., and others. "Studies on Effects of Baths on Man; Diuresis Caused by Warm Baths, Together with Some Observations on Urinal Tides." *Am. J. Physiol.*, 70 (1924), 430–452.
3. Strasburger, J. "Ueber Blutdruck, Gefasstonus und Herzarbeit bei Wasserbadern verscheidener Temperatur und bei kohlensaurehaltigen Soolbadern." *J. Deutsche Archiv. fur Klinische Medizen*, 82, (1905), 459–494.
4. Welti-Kettiger, Ann. 1, "Blutdruck und Puls in und nach Badern." *Schweig Halneal Gessellsch*, Aaron, 1908.
5. Kellogg, J. H. "Therapeutical Use of Water." *Modern Hospital*, 15 (1920), 97–104.
6. Wells, George. "The Effect of External Temperature Changes on Heart Rate, Blood Pressure, Physical Efficiency, Respiration, and Body Temperature." RESEARCH QUARTERLY, III:4 (December, 1932), 108–121.

The Use of Intramural Participation Statistics

By H. Harrison Clarke

School of Education, Syracuse University, and Director of Intramural Athletics

INTRODUCTION

INTRAMURAL student-participation statistics have been used as a means of rivalry between institutions. To compare the numbers participating in intramural athletics has been a favorite indoor sport in many places. It is generally recognized by intramural directors that programs in individual institutions vary because the institutions themselves differ in many respects. Yet, this fact is definitely lost sight of when statistical comparisons between institutions are made.

The following factors tend to invalidate comparing the number of students participating in intramural athletics in various institutions: (1) the size and character of the institution, whether, for example, it is a small men's college or a large co-educational university; (2) the extent and nature of the athletic facilities; (3) the length of time the intramural department has been organized; (4) the amount of financial support for the program; (5) the homogeneity of the interests of the student body, both educational and extra-curricular; (6) the size of the community in which the institution is located, as this may affect the number and nature of outside attractions for the students; (7) the wealth of the student body, as this has a bearing on the amount of student employment and the corresponding amount of time students will have available for recreation; (8) the student housing plan, as the intramural program is simplified when students live in dormitories on the campus and is more complex when students are scattered about the community in private rooming houses; (9) student traditions; (10) student interests already developed.

The growth shown by an individual institution from year to year would be a better criterion of its success than would a comparison of its participation results with some other institution, or by the establishment of statistical norms that would be indicative of success and applicable to all institutions.

Lack of uniformity in the way participation statistics have been compiled has been another source of annoyance. Properly employed, however, they have a real value and the intramural department will find it necessary to keep an accurate account of the numbers taking part in

the activities promoted. These records show the growth of the whole program from year to year as well as the growth of each sport taken by itself. In addition, the statistics on participation furnish a basis for many valuable studies. They constitute an objective method for measuring the extent of the intramural program.

The purpose of this article is to propose a method of compiling participation statistics, and to suggest ways by which such statistics may be used.

DEFINITION OF TERMS

Before participation statistics can be intelligently discussed, it will be necessary to reach an agreement on what is meant by the term, *Intramural Athletics*. In other words, just what is to be included when recording student participation for intramural statistics?

Intramural athletics are generally considered to be a program of athletics "within the walls" or boundaries of one particular school. This definition, however, is not adequate for the present purpose. In reality, there are four general types of athletic activity in the physical education concept. These are: interschool athletics, intramural athletics, athletics as part of the required physical education program, and informal athletic recreation. The boundaries of these four activities should be clearly understood. Consequently, the following considerations are proposed in a definition of *intramural athletics*.

1. The activity should take place within a particular school or institution. Any competition with groups outside the school is extramural in nature. This excludes from the intramural concept, competition between schools in the same city or with outside groups or institutions.

2. The activity should be on a voluntary basis. At an intramural directors' meeting in Chicago a short time ago, "an expression of feeling on this point was unanimous in favor of retaining the voluntary idea."[1] This factor excludes counting students taking gymnasium work as having played intramural basketball or having engaged in intramural track as the case may be.

3. The activity should be organized. If this consideration is accepted, participation in the unorganized or informal type of sports in computing intramural statistics will be eliminated. The department may furnish, and should if possible, facilities and equipment for such athletic recreation. The department should receive credit for this type of service, and may do so as a separate phase of the intramural report.

Thus, for the purpose of compiling student-participation statistics, *intramural athletics include those branches of sports in which organized physical activities are promoted within the student body of a single institution on a purely voluntary basis.*

---

[1] Elmer D. Mitchell, "Intramural Relationships," RESEARCH QUARTERLY, III:2 (May, 1932), 43.

COMPILING PARTICIPATION STATISTICS

The record of student participations in intramural athletics should be taken directly from the score sheets of the various games. In this way only those students actually participating in the program are recorded. At the end of a sport season, each student's participation is transferred to his *Participation Record Card*. One type of card used for this purpose is illustrated below.

PARTICIPATION RECORD

INTRAMURAL ATHLETICS — SYRACUSE UNIVERSITY

1932 1933

NAME: *Button, Harold* — COLLEGE: *T. C.* — CLASS: *1933*

TOTAL: [*26*]

	Cross-Country	Touch Football	Golf	Tennis	Horseshoe Pitching	Bowling	Basketball	Volleyball	Handball	Swimming	Indoor Track	Foul Shooting	Outdoor Track	Playgroundball	Baseball	Boxing	Wrestling	Ping Pong
Fraternity		5					3	5						4				
Class—College							3											
Independents																		
Dormitory																		
Open Tournament				2					4									

An important step in making entries on this card is to place the figure indicating the number of contests in which the student participated in the proper space rather than simply a check mark. At the end of the year, the intramural director has a fairly complete idea of the activity of each individual entering his program. He can tell at a glance whether a student has participated in one contest in one sport only, or has a fairly representative participation record. As each student has a separate card, the possibility of duplicating names is effectively eliminated.

THE USE OF INTRAMURAL-PARTICIPATION STATISTICS

Many statistical compilations may be made from the "Participation Record Card." The intramural director can obtain a clear idea of the extent of his program, and he has several bases for measuring its growth. Three of the more important of these measures follow.

1. *Number of Students Participating.*—The number of different students participating in the intramural program during the year can be determined by merely counting the cards.

2. *Sport Participation.*—One flaw found in using the "number of

students participating" as the only index of the extent of the intramural program is that the player who reports for one sport only is credited as highly as an individual who enters a large number of activities. The term, "sport participation," is used, therefore, to include the duplication resulting from individual students playing in several sports. One such participation is registered for each sport in which a single individual competes. Six "sport participations" are credited to the student on the record card illustrated above, as he competed in touch football, tennis, basketball, volleyball, handball, and playgroundball, a total of six sports.

By totaling the sport participations of all students, the intramural director can determine the total number of sports for all students entering the program, as well as the average number of sports for each student.

3. *Game Participation.*—A complete picture of the intramural participation of the student illustrated above is still lacking. It would be possible for this student to have participated in six different sports, and, yet, only have competed in six contests, one for each sport. To find the real extent of his participation, it will be necessary to determine his game participation figure. One "game participation" is registered for each contest in which a student participates regardless of the sport. The participation of the student illustrated above is twenty-six, as he competed in five games of touch football, two of tennis, six of basketball, five of volleyball, four of handball, and four of playgroundball.

The picture of total student participation in the intramural program is now quite complete. To illustrate the use of the statistical devices described, the following participation results are shown:

1. Number of students participating
   a) 1933-1934 1,367
   b) 1932-1933 1,309

The gain in the number of students participating in the program over the preceding year is 58, or 4.4 per cent.

2. Number of sport participations
   a) 1933-1934 ..... 3,287 Ave. per participant 2.40
   b) 1932-1933 ..... 2,649 Ave. per participant 2.02

The gain in the number of sport participations is 638, or 24.1 per cent, over 1932-1933. On the average each student also, participated in a larger number of sports.

3. Game participation
   a) 1933-1934 ..... 8,375 Ave. per participant 6.13
   b) 1932-1933 ..... 7,007 Ave. per participant 5.33

The gain in game participation is 1,368, or 19.4 per cent, over the preceding year.

The greatest increase in the service of the intramural department was through students entering a larger number of sports, and in entering a greater number of contests in those sports in which they did participate. The fact that 4.4 per cent more students were reached shows that some

progress was made in interesting a larger number of students in the program.

SUPPLEMENTARY STATISTICAL FACTS CONCERNING INTRAMURAL PARTICIPATION

1. *Number of Participants.*—Other student-participation information that would be useful to the intramural director may be drawn from a further study of the participation record cards at the close of each sport. At this time, and before the cards are filed, the number of students entering each sport may be determined. The director will, therefore, be able to watch the amount of student interest in the individual phases of his program.

The participation by sports may be the means of justifying increased expenditures for a rapidly growing activity, or of curtailing, or dropping altogether, the amount spent for another whose following is very limited. For example, in the spring of 1932, playgroundball was first used as an intramural activity at Syracuse University with 347 students competing. During the following year, 573 participants took part, which constitutes a substantial increase of 226 students.

The success or failure of changes in administering sports may also be noted through the number of students participating before and after the change was made. To illustrate, a type of dual swimming meet was substituted for swimming relays during the past year at Syracuse. As a result, approximately one hundred more students participated in intramural swimming, amply justifying the change.

2. *Duplication.*—If the intramural department permits students to participate on a class team and one other in the same sport, as is done in a number of universities, the director may wish to know how much duplication results from this arrangement. This may be determined by the simple expedient of counting the duplications at the end of the year. The sample card shown above illustrates one case of duplication, as the student competed with both his "class-college" and "fraternity" teams in basketball.

3. *Participation by Units of Competition.*—In a large university, several units of competition are used to reach the students. The number of students competing from these various units may be determined. The success of a new unit may also be measured. If the department is placing special emphasis on a particular unit, as may logically be expected if a large number of independent students attend the institution, the numbers competing may be compared with previous years. These and similar problems may be answered.

4. *Participation by Colleges and Classes.*—The number of students from each college and class in the university may also be determined. It is interesting to note that at Syracuse University the two colleges that are non-co-educational, Applied Science and Forestry, show a greater percentage of student participation than do the colleges of the co-educa-

tional type, whether large or small. Also, as may be expected, participation from the freshmen and sophomores has been considerably greater than from the upper two classes.

CONCLUSION

This article on participation statistics is not intended to exhaust all of the possibilities for measuring the intramural program from the administrative viewpoint, which is concerned with the number of students participating. Neither does it answer all the questions of student participation that may arise from time to time. It does, however, present a few of the more important factors concerning student interest in sports that are evinced by the numbers entering intramural contests.

The Objective Measurement of Success in the Teaching of Folk Dancing to University Women

By Mary Effie Shambaugh, Ph.D.
Assistant Supervisor of Physical Education, University of California at Los Angeles

THE FOLLOWING article includes selected chapters from the writer's thesis submitted for the degree of Doctor of Philosophy at the University of California. The problem of objective measurement of success in the teaching of folk dancing to university women was restricted to (1) *Measurement of Knowledge of Folk Lore*, (2) *Measurement of Attitude Toward Foreign People*, and (3) *Measurement of Motor Response in Rhythm*.

Since the measurement of attitudes yielded data of low statistical reliability and validity, only a brief résumé of that phase of the problem is included in the final summary.

I

MEASUREMENT OF KNOWLEDGE OF FOLK LORE

When an effort is made to build up a background for folk dancing, the instructor may encourage students to write themes and term reports for other courses in which they explore peasant art, literature, drama, and music. Because so little has been assembled in any one book which would aid in such exploration in relation to folk dances, the writer has published *Folk Festivals for Schools and Playgrounds*.[1] The special features of the book are: (1) a bibliography on the folk lore of each country represented, and (2) a presentation of settings and pantomimes into which the folk dances may be dramatically incorporated. This book is a direct outgrowth of an interest in the measurement of a knowledge of folk music, costumes, and the closely related folk drama, art, literature, and customs. It has served as a text for the construction of objective tests.

Miss Ruth Elliott of the Department of Hygiene at Wellesley College has made the following statement: "Grading in physical education has very definitely changed for the better. Formerly a student's grade was a composite of time serving and of docile obedience. Now, with a new philosophy behind physical education, sincere attempts are being made to set up sound objectives and, in so far as possible, employ objective methods of measuring each individual's accomplishments in the specific objectives

[1] M. E. Shambaugh, *Folk Festivals for Schools and Playgrounds*, New York: A. S. Barnes and Company, 1932.

we set up."[2] "Sound objectives" in the teaching of folk dancing include knowledge of folk music, distinctive patterns of dances, and the national costumes of the people whose dancing is studied. An "objective method of measuring each individual's accomplishments" is found in the examination in folk dancing used by the writer in teaching both recreational groups and classes restricted to majors in physical education. A copy of that examination is inserted in order that the discussion of its value may be clear.

The particular values of the examination may be presented under (1) values to the instructor, (2) values to the students of a university. For the instructor of folk dancing, such a form (1) serves as a guide for the incidental instruction which should be brought to the student when no special period is allowed for the discussion of theory. (2) The examination is a check upon the instructor's familiarity with material related to the dances she has presented. (3) Short but frequent practice tests, similar to divisions of the final examination, require only a few minutes and emphasize review where it is most needed. (4) The form of the test is such that it may be repeated indefinitely since the order of the music, particular step patterns, pictures, and references to nationalities may be changed for each group. (5) The examination is quickly corrected by an exchange of papers. (6) The last two items, which are not scored, enlist the cooperation of each student. The instructor who encourages contributions from the class will learn and be stimulated by the interesting pictures and notices of current events brought for the bulletin boards. Students frequently are in touch with programs of folk dance societies and often bring national costumes of unusual beauty. Some students are found to be members of the societies and are even able to demonstrate folk dances and thus bring valuable material to their group. University classes arrange to attend gatherings of national groups. In turn, national societies attend informal hours for folk dancing at the universities.

The value of the objective examination to the student is: (1) It requires close attention to melodic line, and to the distinguishing characteristics of folk music from different countries. The superior students rank high on the examination and appreciate a recognition of their ability. (2) It encourages voluntary reading on travel and folk lore. (3) It stimulates among the students a feeling of responsibility for the success of the course.

Those who do not accept the advantages to the instructor and student of objective measurement of a background for folk dancing seem to feel that there is a loss in spontaneity. They claim that when the dancing engenders joy, recreational values are sufficient objectives. If the period for folk dancing resolves into long discussion, then it is true that the

[2] R. Elliott, "Modern Trends in Physical Education," RESEARCH QUARTERLY, I: 2, (May, 1930), 74–85.

amount of active participation is so little that the recreational values are lost. The point is that only a few minutes are required to direct attention to special characteristics of the music, exhibits of costumes, related current events, or illustrations in interesting books and magazines. Among university women, the interest in folk dancing is heightened. They appreciate a presentation of the cultural values as well as the recreational.

EXAMINATION IN FOLK DANCING

1. Recognition of folk music, giving name of folk melody.
   1
   2, etc. to 20.
2. Recognition of folk music, giving nationality of folk melody.
   1
   2, etc. to 20.
3. Recognition of steps, giving name of folk dance from which each movement demonstrated before the class is taken.
   1
   2, etc. to 20.
4. Recognition of nationality of folk costumes shown during the examination. (Pictures of costumes may be used.)

1	3	5	7	9
2	4	6	8	10

5. Write the name of the author for five collections of folk dances used in this course. (The titles will be dictated during the examination period.)

1	1
2	2
3	3
4	4
5	5

6. Write the words for a.....folk song learned in this course. (The particular nationality will be specified during the examination.)
7. One reference for illustrations of.....folk costume is..... A different reference for.....village setting is..... A collection of .....folk songs is found in.....by..... (The particular nationality will be specified during the examination.)
8. What contribution to the bulletin board has interested you most?
9. What have you contributed toward the success of this class?

(The last two questions do not score but are indicative of your cooperation in making this class a success.)

When copies of such an objective examination are shown to the students at the beginning of the course, they read it carefully. A rapport is established between the instructor and the class. Subjective grading on their execution of the dances is frequently distrusted. An objective examination gives both student and instructor a feeling of satisfaction that a fair scoring supplements more subjective judgment ratings. Having seen the examination, students more enthusiastically undertake to prepare themselves. They also immediately begin a search for something which they can specially contribute toward the success of the group.

Total scores on the first four questions for a group of 129 students were studied. This group included students receiving one-half unit credit for two half hours of folk dancing. The presentation of folk lore was incidental. The following data indicates the success of the group:

Highest possible score on the first four questions	70.
Range of scores	24–70.
Mean or average score	55.6
Median or middle score	58.4
Standard deviation from the mean score	10.8

The total scores on the first four questions of a group majoring in physical education included thirty-four students. This group included students receiving one unit credit for two half hours of folk dancing and one hour of lecture each week on folk lore. The following data indicates the success of the group:

Highest possible score on the first four questions	70.
Range of scores	45–70.
Mean or average score	64.5
Median or middle score	65.2
Standard deviation from the mean score	6.9

It should be understood that both groups received the same amount of preparation for these four questions. The special lecture period of the students majoring in physical education did not include discussion on recognition of music, step patterns, or costumes. A comparison of the success of the two groups is in terms of central tendency, variability, and overlapping. (1) The mean of the major group, as 64.5, is markedly higher than the mean of the recreational group as 55.6. This may be interpreted as indicating that students majoring in physical education are a selected group in musical ability. It may simply mean that the major students have a keener interest in their success in physical education and therefore score higher because of having made greater effort than the general recreational group. From an observation of the individual students, the writer believes that both factors are involved. (2) The standard deviation of the major group as 6.9 is markedly lower than the standard deviation of the recreational group as 10.8. This lower variability of the major group is in accordance with the expected standard deviation of a highly selected group. (3) The overlapping of the recreational group when compared with the majors in physical education may be stated as follows: What per cent of the recreational group reach or exceed the median of the majors? In other words, what per cent of the recreational group reach or exceed 65.2 as the median of the majors? Thus 20.7 girls were found to be above 65.2. This means that approximately 16 per cent of the recreational group reach or exceed the median of the majors in physical education. Whereas 50 per cent of the majors are above 65.2, only 16 per cent of the recreational group attain that success.

In addition to the examination which has been discussed as fundamental material required of all students studying folk dancing, the majors in physical education were given an objective examination on the material of the lecture period which supplemented their practical work in the gymnasium. A copy of that examination is inserted as a basis for discussion. The lecture periods of the course in preparation for the examination were devoted (1) to special sources of information on the various phases of folk lore as folk art, drama, literature, and customs and a comparative study of the same; (2) to an analysis of the technique of teaching folk dancing.

KNOWLEDGE OF FOLK LORE AND TECHNIQUE OF TEACHING

(Special Questions Given a Group of Majors in Physical Education)

1. Give the nationality of five folk tales and outline one on the reverse side of this sheet.

1

2, etc.

2. Before each item in Column 1, write the number of the person in Column 2 associated with the publication. (Persons will be specified during the examination.)

Column 1—Ten Publications on Folk Lore. Column 2—Persons Associated

1

2, etc.

3. Without duplication and without repetition of references in Questions 1 or 2, give a source of information for the correlations of folk dancing with folk art .....; with folk drama.....; with folk literature.....; with folk customs.....

(The particular nationality will be specified during the examination.)

4. State in one line for each, steps in the presentation of a folk dance which is new material in a lesson.

(The particular dance will be specified during examination.)

1

2, etc.

5. After each of the list of ten dances write 3rd, 6th, or Junior High, according to the level at which the dance should be first presented.

(The list of dances will be dictated during the examination.)

1	4	7	10
2	5	8	
3	6	9	

6. Diagram on the back of this sheet the steps for a folk dance which will be specified during the examination.

In attempting to enrich a course in folk dancing, how far afield should the instructor wander? When fortunate enough to have a lecture period and the opportunity to build up a special background, should assigned material and lectures be limited to closely related study of folk lore and the teaching of the dances?

There are extreme positions. In his discussion of measurement in physical education, Dr. Symonds has said: "There appears to be a feeling among physical educationists that the physical side of a man's nature is lower than the social and the mental; and if they would raise their department in the eyes of all concerned they too must aim primarily at

those most exaltant, non-physical things of mental and social type."[1] Dr. Symonds would imply that folk dancing should be presented as exercise. He would not expect the instructor to present any background for the dancing.

The opposite extreme is found in the following statement: "Build up a background by using *any* historical material, pictures, stories, written or oral, that can be found."[2] Again in the outline of a curriculum[3] for a group of majors, the course in folk dancing of a state college in Missouri includes a presentation of philosophy, influence of climate, geography and many other topics which do not bear closely upon the dancing. Such topics may be developed at the student's initiative, but such wandering afield may not be included in the objective measurement of folk lore closely related to particular dances.

"What should be the proportion of time devoted to activity and the presentation of a background for folk dancing?"

The examination for all students studying folk dancing required no additional work on the part of the students outside of the few minutes while the class was gathering. Within the half-hour period, a maximum of five minutes was required to call attention to announcements, posters, and pictures contributed by members of the classes. Short five-minute tests were given about once a month on recognition of music for the dances studied. An attempt to secure cultural values from the study of folk dancing should not reduce, but very slightly, the amount of actual dancing. The teaching of folk dancing should *not* resolve into a discussion *about* dancing with little actual *"doing."*

For majors in physical education and for the general students, whenever the schedule allows an hour of theory with each two half hours of dancing, the second examination included in this chapter, indicates the possibilities when theory and practice are balanced in time values.

"What are the sources available for presentation of folk dancing as a cultural subject rather than simply as a motor skill?" Such a presentation involves folk art, music, tales and legends, drama, costumes, and customs as well as dancing. Bulletins of museums, books on travel, illustrated children's fairy tales, and such magazines as the *National Geographic* contain an immense amount of information which is seldom appreciated as closely related to the dances of specific countries.

A final question concerning measurement of knowledge is: "How does the testing of a knowledge of folk lore meet the criteria of a good examination?"

The examination for general recreational groups has been found to

---

[1] P. M. Symonds, *Measurement in Secondary Education*, p. 185. New York: The Macmillan Company, 1924.

[2] R. D. DeWindt, "A Method of Teaching Folk Dancing," *Journal of Health and Physical Education*, I: 5, (May, 1930), 36.

[3] W. D. Haynes, "Theory and Practice in Folk Dancing," *Journal of Health and Physical Education*, I: 8, (October, 1930), 22.

have a reliability of .88 with a probable error of .02 when given to students enrolled for folk dancing at the University of California Summer Session in Berkeley, 1932.

The validity of the examination as a test of knowledge of folk lore depends upon no one text or collection of folk dances. The instructor is free to use any collection. The particular text prepared in connection with this study (*Folk Festivals for Schools and Playgrounds*), is recommended because other collections present only the dances or dances with illustrations. When an annotated bibliography on folk lore is at hand in the same book with descriptions of the dances, the instructor informs herself more easily and quickly on phases of folk lore which may be neglected, and therefore omitted from objective examinations.

The ease of scoring and administration of the test have been indicated under the discussion of advantages of such examinations for both instructors and students. The examination is quickly corrected by an exchange of papers. The form of the test permits repeated use since the order of music, demonstration material, pictures, and references may be changed for each examination.

The objective examinations are practical because they are inexpensive and require but one period for the entire test. Practice on parts of the test requires but five minutes.

Summary of the Objective Measurement of Knowledge in the Teaching of Folk Dancing.—Objective examinations can be constructed which meet the criteria of a good examination in reliability, validity, scoring, ease of administration, and practical value. A reliability of .88 with P.E. of .026 indicates that a group, who have received only a few minutes within each period of instruction on music and folk lore, are not guessing when they complete the examination. The need has been especially for a text which contains references for the use of the instructor who wishes to inform herself. *Folk Festivals for Schools and Playgrounds* by the writer meets that need. Instructors who are well informed find it possible to "boil down" their information and present folk dancing as a cultural subject with no decrease in the spontaneous enjoyment of the students.

II

MEASUREMENT OF MOTOR RESPONSE IN RHYTHM

Marey Experiments on Walking and Running.—In Volume 3 of the *Human Physiology,* Luciani describes the experiments of Marey on walking and running. Figure 74 on page 116 of that reference shows a man walking with special shoes. He carries in his hand the recording apparatus. These shoes and the apparatus are very briefly described as follows: "An air-chamber in the soles of the shoes communicates by a tube with a recording tambour, which writes upon a portable revolving cylinder, held in the hand of the experimenter." The statement is made that an experimenter named Carlet "secured better tracings by soles on shoes

with two interconnecting air-chambers. (One near heel, one near front of the metatarsus.)"

The curves secured by Marey are as shown in the tracings from Luciani's account of the experiment.

Marey's First Chrono-Photographic Method for Walking.—Luciani also records in his *Human Physiology* two special techniques used by Marey in the study of walking.[4] The first method was as follows: Records were photographs on one fixed plate of the successive images of a person walking. The subject photographed was so costumed that one-half of the body was in black against a black background. One-half of the body was in white and distinctly outlined against the black. Thus the successive images were of the one-half of the body which was white. The rhythmic character of the walking is shown when the foot (in white) on the side toward the camera receives the weight at regular intervals in the walking.

Marey's Second Chrono-Photographic Method for Walking.—Luciani describes Marey's second technique in photographing the movements of a person walking or running as follows: Six metal buttons were placed at articulations with a shining band over the bone of the arm, forearm, thigh, leg, and edge of the foot. The person was costumed completely, including his head, in tightly fitting suit of black so that the photographs showed only the buttons and shining bands. It is as though a stick figure is walking or running. Oscillations of the head and the cycles of movements by arms and legs indicate the rhythm of the subject.

STUDIES OF MOTOR RESPONSE

Baldwin and Stecher Study.—Baldwin and Stecher have reported an experiment with children in *Psychology of the Preschool Child.*[5] The statement is made that "few children of this age seem able to mark time with the feet, or to clap hands in time to the music." The experiment was one of keeping time so that no distinct pattern or series of tests was attempted. The tracing shows (1) the child's record, (2) the record of one of the experimenters with a good sense of rhythm, (3) fifths of a second marked on a smoked drum by a Jacquet chronometer simultaneously with the other two records. The child claps two blocks faced on one side with copper. The experimenter, whose record appears on the drum below the child's, is in another room and claps two blocks as does the child when the phonograph starts.

Thus one experimenter is making a record on the drum at the same time as the child. Another operates the apparatus. A third experimenter sits beside the child, gives instructions, and holds the child's hands in order to help clap the blocks a standard four times before saying "Now you keep on doing it yourself until I tell you it is time to stop." This

[4] Luigi Luciani, *Human Physiology*, Vol. III, London: Macmillan Co., 1915.

[5] B. T. Baldwin and L. I. Stecher, *The Psychology of the Preschool Child*, pp. 141–145. New York: D. Appleton and Company, 1924.

third experimenter also takes notes during the forty-five seconds of the record.

Among the "observational notes," this is particularly significant of the difficulty in imposing a rhythm upon the natural tempo of the individual child. The children with a poor sense of rhythm were often observed to be beating time correctly for a few measures after the experimenter had started them off well, but then lagged or speeded up, maintaining a characteristic rhythm of their own.

C. P. Heinlein.—"A New Method of Studying the Rhythmic Responses of Children Together with an Evaluation of the Method of Simple Observation"[6] has been reported by Christian Paul Heinlein. The experiment was conducted at Johns Hopkins University. Special electrical apparatus was used whereby the keys of a piano (being played mechanically) were connected with the recording drum. A child wearing a small stirrup bound to one shoe walked along a track. The contacts of the stirrup with the track gave the objective record of the rhythm as the child marched in time with the piano. The records obtained indicated that simple observation cannot be relied upon in judging a child's accuracy in timing. The significant statements are quoted.

"In an analysis of the records of the children's performances, the following facts attract attention. Only two children out of the total eight gave any evidence of an ability to synchronize their foot movements with the musical beat. In regard to the rhythmic capacities of several children, results obtained through exact measurement do not agree with the judgments of the writer previously affected through simple observation."[7]

Again Dr. Heinlein states: "Thus it may be seen that an observer may be easily illusioned to judge an unusual energetic display of motor activity following musical stimulations as a rhythmic response, when in reality no simple mathematical relation may ever exist between the bodily movements and the musical tempo."[8]

E. Garfiel.—"The Measurement of Motor Ability"[9] has been reported by Evelyn Garfiel. The experiment was conducted at Barnard College. Aspects of motor ability analyzed are listed as follows:

"1. Speed of voluntary movement
2. Accuracy of voluntary movement, i.e., coordination
3. Strength
4. Motor adaptability, i.e., capacity to solve motor situations, to make a new coordinated movement accurately."[10]

---

[6] C. P. Heinlein, "A New Method of Studying the Rhythmic Responses of Children Together with an Evaluation of the Method of Simple Observation," *Journal of Genetic Psychology*, XXVI: 2, (June, 1929), 205–229.

[7] *Ibid.*, p. 215.

[8] *Ibid.*, p. 222.

[9] Evelyn Garfiel, "The Measurement of Motor Ability," *Archives of Psychology*, New York: (April, 1923).

[10] *Ibid.*, p. 3.

Of particular interest as bearing on this thesis is the test of speed and the conclusions on motor adaptability.

The use of this apparatus is described by Garfiel. "By running in place, contact is made alternately at A and B, (which are on separate boards), the board under each foot being released, as soon as the foot is raised, by the stout springs which rest on a board inside the box and support each foot-board. The score equals the number of contacts in thirty seconds. The experimenter demonstrated the working of the apparatus and allowed the subject a two-second preliminary trial."[11]

Motor adaptability was tested by success of the subject in repeating stunts performed by the experimenter. These statements are made: "Students differ not only in speed and strength of movement, but also in their ability to see through a motor situation; I mean merely to make quickly a difficult new reaction."[12] "Properly to differentiate between people with good and with poor motor ability, we must try to allow for this factor of speed of motor learning."[13]

S. I. Franz.—In his studies of the diffusion of motor response, Dr. S. I. Franz has used very interesting apparatus.[14] The contraction of a muscle generates an electric current. Electrodes may be attached to the active muscles. The delicate mechanism of a radio picks up the electric current of the body and the motor response is photographed on the film of a small moving-picture machine. The same muscles may be contracted (for example, as in the grasping of a dynamometer) but the electrodes be attached to a different part of the body in which no movement is perceptible. Upon the grasping of the dynamometer, motor response may be found also in a group of muscles apparently inactive. Such studies of diffusion may explain the awkwardness in many motor responses.

Rhythm Test in Minnesota Study of Mechanical Ability.—In the preliminary battery of tests used by the University of Minnesota for its study of mechanical ability, the following rhythm test was given:

"The apparatus consisted of a pendulum adjusted to make three oscillations in two seconds. When the eye was fixated on the mid-point, the bob passed the eye once every two-thirds of a second. The pendulum was allowed to swing before the subject for two minutes and was then stopped. The detailed instructions to the subjects were:

"When I swing this pendulum, all count out loud as the weight passes this point (point of rest). Ready, go! (The pendulum is allowed to swing about fifteen times.)

"Now, this time count to yourselves. I am going to stop the pendulum after it swings about ten times, and I want you to keep right on counting to yourselves until I say 'stop,' then tell me what number it is (or write).

---

[11] *Ibid.*, p. 4.
[12] *Ibid.*, p. 5.
[13] *Ibid.*, p. 5.
[14] S. I. Franz, Unpublished Research, University of California at Los Angeles.

"Now we are ready. I'll swing the pendulum and stop it after it swings a few times. Start counting with the first swing and keep on counting after I stop the pendulum until I say 'stop'; then write on your paper the number that you had counted to when I said 'stop.' Be careful not to count out loud and do not move your arms or heads because you will disturb someone else. Ready, go! (E. dropped the pendulum as he said 'go').

"Pendulum was stopped and put out of sight after it had swung twenty times at the rate of one and one-half swings per second. At the end of sixty-six seconds, E. said 'stop.' Write down the number. Now cover the number you have written with your left hand.

"*Three trials.* In the retest, the pendulum was swung for forty-four seconds.

"*The score* for each trial was the number of deviations the subject had from the number he should have reached."[15]

Carl E. Seashore.—The Psychology of Musical Talent[16] by Dr. Carl E. Seashore includes a series of tests measuring sense of pitch, intensity, time, consonance, and memory. A sixth test of rhythm has been added. All of the tests use Victrola records. The subject is asked to listen to the records and make increasingly finer discriminations. The test of rhythm bears most closely on this study. Complete accounts of the standardization have been published in the University of Iowa Studies[17] and in *Science*.[18] An article was also published by Jacob Kwalwasser.[19]

The instructions for the test, a key, and a table for ranking in rhythm, are found in the manual to be used with the Victrola records. "You will hear in rapid succession two rhythmic patterns. The second is either the same as the first or different. Listen and record either *S* for same, or *D* for different." (The examiner will illustrate what is meant by rhythm.)

Lillian L. Stupp.—In her Master's Thesis at the University of Wisconsin, Lillian L. Stupp reported "A Correlation of Musical Ability and Dancing Ability." This statement is made regarding individual differences. "The auditory perception, the appreciation of music may rate high, yet one's motor power to express such by means of rhythmical bodily movement may be lacking or at least undeveloped."[20]

Miss Stupp acknowledged the subjective rating of an instructor's

---

[15] D. G. Patterson, R. M. Elliott, L. D. Anderson, H. A. Toops, E. Heidbreder, *Minnesota Mechanical Ability Tests*, Minneapolis: University of Minnesota, 1930.

[16] C. E. Seashore, *The Psychology of Musical Talent*, Boston: Silver, Burdett and Company, 1919.

[17] R. H. Seashore, "Studies in Motor Rhythm," *Psychological Monograph, University of Iowa Studies in Psychology*, Vol. IX.

[18] C. E. Seashore, "New Rhythm Apparatus," *Science*, New Series, LIX (February 8, 1924), 146–147.

[19] J. Kwalwasser, "The Measurement of the Sense of Rhythm," *Musical Observer*, (June, 1924).

[20] Lillian L. Stupp, *A Correlation of Musical Ability and Dancing Ability*, A thesis submitted for the Degree of Master of Arts, University of Wisconsin, 1922.

grade as her measurement of rhythmic motor ability. "The only means of measuring artistic quality of this sort is by the teacher's estimate and this proves to be scientifically unreliable."[21] With regard to the correlation of the Seashore tests with subjective grading of dancing ability, this is the conclusion: "From these results we are able to conclude that there is a correlation between musical capacity measured by the Seashore tests and dancing ability according to the teacher's estimate."[22] The preceding statement referred to the correlation of the entire series of five tests. "However, as single tests of pitch, intensity, time, consonance, and memory, there is not as significant a correlation with grade. Time and then intensity correlate highest with the grade."[23]

Thomas Annett.—In 1932, Thomas Annett reported a "Study of Rhythmical Capacity and Performance in Motor Rhythm in Physical Education Majors."[24] The study was made at the State Teachers College at LaCrosse, Wisconsin. The measurement of "rhythmical capacity" was by the Seashore Rhythm Test. The test was given three times and the average score computed. The measurement of "performance in motor rhythm" was as follows: The group of students was divided into squads of four. There were three judges: a musician, and two teachers of dancing. Each student was rated by each judge on (1) precision in rhythmic movement; (2) grace in rhythmic movement; and (3) spontaneous and natural movement. An average of the scores of the three judges was used. The precision test was a "triple step-hop right forward alternating with eight running steps forward." The spontaneous and natural movement was the same exercise except that the student substituted a "movement of his own choosing" for the run. Mr. Annett stated that he found his group "somewhat above the average in rhythm discrimination." The scores on the motor performance were found to be distributed according to a normal curve. On the basis of that normal curve in the distribution of the 122 subjects, he felt that the subjective judgments had proved valid testing. This basis is to be questioned since the group were highly selected majors in physical education. The correlation between the Seashore Rhythm Test and the subjective judgment of performance in motor rhythm was .47 with a probable error of .05. Annett quotes Rugg in considering a correlation of .47 as "marked," and states in his report that "ordinarily .47 is considered a 'marked' correlation." This would mean that the Seashore Test would place 12 out of every 100 exactly in motor rhythm, while many of the remainder would be close.

The writer's research in the measurement of motor response in rhythm included two experiments. The results of those experiments are summarized in a later section of this article.

---

21 *Ibid.*, p. 43.
22 *Ibid.*, p. 43.
23 *Op. Cit.*, p. 43.
24 Thomas Annett, "A Study of Rhythmical Capacity and Performance in Motor Rhythm in Physical Majors," RESEARCH QUARTERLY, III: 2 (May, 1932), 183.

Experiment I refers to the study in which records were secured on a revolving drum attached to a specially constructed experimental machine.

Records for Experiment I were first secured using dry batteries. Later a large Ford battery was connected with the clock and then through a relay, connected with a timing stylus marking on the revolving drum.

III

SUMMARY AND SUGGESTIONS FOR FURTHER STUDY

The problem of this study was stated as follows: "The objective measurement of success in the teaching of folk dancing to women in a university will be studied as (1) measurement of knowledge, (2) measurement of attitude, and (3) measurement of motor response." A brief summary of results will be the basis for conclusions regarding the significance of the research.

Measurement of Knowledge.—In the measurement of knowledge of folk lore related to traditional dances, the first step was the publication of *Folk Festivals for Schools and Playgrounds* as a collection of folk dances with descriptions of typical settings, illustrations of costumes and bibliographies on folk costumes, legend, music, art, and customs. This collection represented research work on the lore of many nationalities and included the results of a study of manuscripts in foreign libraries and museums as well as active participation in European village festivals.

The second step was the construction of objective examinations based upon the folk lore of *Folk Festivals for Schools and Playgrounds*. These examinations were given to students enrolled for folk dancing at the University of California in Berkeley and Los Angeles. The values to an instructor using such examinations are: (1) guidance in the presentation of a cultural background in classes primarily organized for physical activity, (2) familiarity with a wealth of folk lore from which to draw incidental instruction, and (3) aid in the organization of frequent short practice tests.

The form of the objective tests permits indefinite repetition of the same stencil at a minimum expense for mimeographing and scoring. The unscored item asking the students what had interested them most on the bulletin board and what each had contributed to the success of the group enlists cooperation and establishes a rapport between instructor and students.

The values to the student are: (1) reward for accurate knowledge of definite folk lore, (2) stimulation of effort to contribute to the success of a group, (3) encouragement of reading on travel and contacts with foreign groups in this country. The grade received on the written objective examination is averaged with grades received on skill in execution of the folk dances. Thus motor ability in doing the dances is supplemented by knowledge of the music and customs associated with the people from whom the dances have come.

The items included in the objective examinations constitute a valid test since rhythmic pattern of movement, folk song, costumes, and customs are all recognized as phases of folk lore. The reliability of the examination used for all students was .88 with a probable error of .02 when duplicate forms were used with a group of 33 students enrolled during the summer session of 1932 at the University of California at Berkeley. According to Ruch, a reliability coefficient of ".80 to .89 . . is . . fairly high." In the first semester of 1932 at the University of California at Los Angeles, the same examination was given 32 majors in physical education and 81 students in recreational classes. By a correlation of split halves and application of the Spearman-Brown prophecy formula, a reliability of .84 with a probable error of .05 was secured in the major group and .90 with a probable error of .01 in the recreational group. The higher correlation with the recreational classes is as expected from a larger and more heterogeneous group.

The tests of a knowledge of folk lore were also studied in a comparison of students majoring in physical education and general recreational groups. The first 4 items on the objective test required association of folk melodies with particular dances and nationalities besides recognition of rhythmic patterns of movement. Only 16 per cent of the recreational group of 129 students reached or exceeded the median of the 34 students who were majoring in physical education. This superiority in score by a small picked group may not be due to superior ability but to greater incentive and effort on the part of students who intend to use the material later in teaching folk dancing. The range of scores in the large recreational group was 24 to 70 in contrast to the narrow range of 45 to 70 among the majors. A mean of 55.6 in the large group with a standard deviation of 10.8 was found whereas a mean of 64.5 and a standard deviation of 6.9 was secured with the more homogeneous smaller group.

The results in reliability coefficients, range of scores, mean, and standard deviation as reported from the use of the objective test of knowledge with small specialized and large general groups of students, may be interpreted as typical. The larger the group to whom the tests are given, the higher the reliability coefficient which may be expected. The more heterogeneous the larger group, the wider the range in scores with a possible lower mean and larger deviation from that mean.

Conclusions from the Measurement of Knowledge of Folk Lore.—Folk dancing is best presented to university women as a cultural subject rather than simply as a physical activity. When the practical periods in the gymnasium are not supplemented by a lecture hour, incidental instruction on the background for folk dancing can be presented most efficiently through bulletin boards and through the use of a collection of dances emphasizing illustrations of costumes and bibliographies on folk music, art, and customs. Through the use of such material, the instructor is able to inform herself on lore related to a particular dance.

Written objective examinations on the background for the dances should be given as well as tests of motor skill in the execution of the movements. Such examinations have values for both the instructor and students. The items of such examinations should include the rhythmic patterns of movement, folk song, costumes, and customs as recognized phases of folk lore. A high reliability may be obtained in the use of such an examination as was constructed in this study provided a large heterogeneous group of students is tested.

Measurement of Attitudes.—In the measurement of the attitudes of students in folk dancing classes toward foreign people, questionnaires were prepared. The first and second forms were used in an effort to demonstrate changes in prejudices with a more friendly attitude toward foreign people at the close of a semester's instruction in folk dancing. An experimental group of students studying folk dances and a controlled group studying another type of rhythm for the same length of time were scored at the beginning of a semester and again at the close. Students in the group who had studied folk dancing showed a significant difference in the direction of a more friendly attitude. Students in the controlled group did not. The question became: "Was the significant difference in the experimental group due to the study of folk lore?" A careful examination of the early forms revealed that they were too wide in scope to prove that the question might be answered "yes."

A third form was prepared in an effort to secure more specific attitudes. This form included a report of the approximate number of new acquaintances made during a definite length of time. Magazines on travel which were read and foreign groups contacted were checked on lists. The Bogardus idea of "social distance" was used as the student checked those nationalities which he would welcome as intimate friend, neighbor, fellow citizen, or impersonal correspondent. Other items showed interest in the foreign news of magazines, newspapers, moving pictures, lectures, concerts, travelers, and foreign students.

Form III was completed by an experimental group with no controlled group for comparison. In the use of the first two forms, it was found impossible to secure groups in which paralleled factors influenced the attitudes of the students with the exception that one group was stimulated by the study of folk dances and the other was not. With 34 students a reliability of .79 with a probable error of .04 was secured. This coefficient was based on split halves and application of the Spearman-Brown prophecy formula. With the same group of 34 students, significant differences were found in scores at the beginning and close of a semester since the difference was 3.7 times the standard deviation of the difference. The inference thus far was that Form III was fairly reliable and that instruction in folk dancing for one semester was influencing students in the direction of more friendly attitudes toward foreign people.

The question of validity of Form III was then tested by correlation

with a new form which purported to measure the same attitudes. Forms IV and V were identical except for the instructions at the top of the questionnaire. In Form IV the instructions were to rate the degree of friendliness toward foreign people expressed in the statements. These papers were used in a study of weighting in the scoring. In Form V, the instructions were to express agreement, disagreement, or indifference toward each statement.

Ninety-two students completed both Forms III and V which aimed to secure expression of the same attitudes. A correlation of .11 with a probable error of .06 was found so that these forms appear to possess little validity.

Conclusions from Measurement of Attitude.—An effort was made to measure the attitudes toward foreign people and in particular to measure changes in attitude due to instruction in folk dancing for one semester. Although a questionnaire was constructed of fair reliability, low validity destroyed confidence in the scores. The inference from the data of this study is that attitudes are very specific. The criticism of the forms used is that many phases of personality were involved instead of one. In answering an item on the questionnaire, students varied in their interpretation and the same student varied according to his interpretation of the moment.

One semester's instruction in folk dancing seems to furnish enjoyment of specific dances. The student does not generalize from his specific pleasure in a German dance to increased appreciation of German people. A single unpleasant experience with a particular Italian person influences the feeling toward all Italians more than the study of Italian dances. The conclusion seems to be that the emotional feeling from folk dances is largely pleasure or displeasure in the physical activity with a cultural background of knowledge about the people from whom the dance came. The writer believes that adult women in a university have their attitudes of friendliness toward foreign people practically set as the result of earlier experiences.

Measurement of Motor Response.—In the objective measurement of rhythmic motor response, the most valuable results were the development of two techniques. Further experimentation is necessary for the measurement of improvement or achievement through the use of those techniques.

Experiment I required a specially constructed platform. Attached to the platform, on which a subject performed rhythmic patterns, was a revolving drum. Metal pointers in contact with the drum, recorded (1) the time in seconds, (2) the movements of each arm, and (3) the movements of each foot. The five pointers could be adjusted so that one or any combination of the five might trace on the chemically treated paper found on the drum. Hundreds of records were made in perfecting the mechanism and selection of movements to be used. These records were

discarded when the final group of fifteen students were chosen for Experiment I. All members of the group were well known to the experimenter. They represented extremely good or extremely poor rhythmic ability as observed in classes studying folk dances. The grade of each student at the end of a semester's instruction in rhythm had been based on the writer's subjective judgment. The testing of these students objectively permitted a comparison of objective and subjective ratings.

In Experiment I, five tests were given each of the fifteen students. These tests required the subjects while standing upon treadles to draw cords (grasped in the hands) through openings in the platform as they executed specific rhythmic patterns chosen from English, Swedish, Irish and Spanish folk dances. Each pattern was first demonstrated by the experimenter with a standard number of repetitions in the tempo set by a metronome. The number of seconds required for the execution of each pattern is known. The average number of seconds required by a subject for execution of a pattern was compared with the correct timing. The per cent of deviation was computed as the basis for a scale of points. A subject having .0—.05 as the per cent of deviation scored 4 whereas .20 or more received no points. Thus a maximum of 4 points was awarded on each of the 5 tests for excellent adaptation to the *imposed* tempo. As will be further explained, excellent performance of the rhythmic pattern could receive a possible total of 16 points. A maximum of 4 points for timing may at first seem small in comparison with a possible 12 points awarded for correct coordination in the arm and foot movements. An unusually rhythmic performance might be in the subject's *natural* tempo. Students were noted to show skill in motor response with a quick grasp of the pattern but they timed the movements slightly faster or slower than the metronome. Those who possessed such coordination plus adaptation to the imposed tempo were rewarded the possible four points on timing.

Tracings made by the pointers recording movements of the arms and feet were compared with a criterion made (after many trials) by the experimenter. A subject's record of correct coordination received three points for each arm and foot or a possible twelve out of the total sixteen. The rhythmic pattern in each of the five tests used resulted in a distinctive tracing. Many preliminary tests were discarded because either small range or rapidity of the movement did not permit accurate judgment of the subject's performance upon comparison of records with the criterion.

Throughout the testing on the machine, possible sources of error and causes of individual differences were noted by the experimenter. (1) Arm movements in a vertical plane were demonstrated since the cords grasped in the hands were then drawn through a wider range and resulted in clearer records. The direction of arm movements in an oblique plane, as well as the factor of length of arm, explained differences in the height of the curve in a tracing. (2) It was found important to check on each test

the tautness of the cords before the arm movement began in order that the tracing might record the complete movement. (3) A single revolution of the drum did not permit more than five repetitions of any rhythmic pattern so that the experimenter did not place the drum in contact with the metal pointers until a subject was well started. (4) Those students who had confidence in their rhythmic ability or who were accustomed to tests in the psychological laboratory seemed less nervous. Others would flush and hesitate about beginning. One subject weak in rhythm, always remarked: "I don't believe I can do that," and thus showed lack of confidence. (5) A subject's intelligence influenced her ability to grasp a complete pattern. Before stepping upon the platform, many students remarked: "Let me think it through for a moment." (6) Good eyesight in noting details of a demonstration, good hearing in receiving the tempo (both from the metronome and accents in the foot movements), and a kinaesthetic feeling of how the action is done; all were factors influencing success. One interesting subject was a teacher of dancing. Before starting, she frequently shut her eyes and stood quietly on the machine listening to the metronome. "I have the feel of it," she would say and begin at once a perfect performance of the pattern. (7) Although the tests were given to all of the group as nearly at four o'clock in the afternoon as possible, the students varied widely in fatigue according to their activity during the day.

The technique of Experiment I permitted the ranking of the 15 subjects according to total score of each on the five tests. Each subject had been a student for at least one semester in a folk dancing class of the experimenter, and was subjectively ranked according to the rhythmic skill shown in that course. The correlation by the method of rank difference between objective measurement on the machine and subjective judgment at the close of a semester was .77 with a probable error of .07. This is only a fair correlation but the inference drawn by the writer is that the technique developed on the machine yields records which are fairly reliable in the selection of extremely good or poor rhythmic ability. Tracings made by students of average ability in rhythm failed to indicate differences when their records were compared. The conclusion is that the machine used in the study of rhythm is valuable in advising students majoring in physical education. Those majors who receive very high scores should be encouraged to specially prepare to teach rhythm. Those who receive very low scores should be advised that their tests have shown a handicap which they should endeavor to overcome by proficiency in other types of activity. At the same time, they should make a maximum effort to improve in rhythmic work. Students whose records show difficulty in adaptation to an imposed tempo can improve through conscious effort to follow a variety of tempos in practicing rhythmic movements. Students without physical deformity whose records show poor coordination can improve with increased experience in rhythmic expres-

sion and particularly with increased confidence in themselves and mental poise.

Because of the time required for its use, the experimental machine has been found impractical for measurement of all the students enrolled in the large recreational groups in a university. The majority of such students have average ability and the technique could be used best only with the occasional individual extremely poor in rhythmic ability. For special cases of extreme gift or disability, a *group of tests* has been found more satisfactory than a single performance. Within Experiment I, Test II yielded the highest correlation with total scores on 5 tests. This was .85 with a probable error of .05. A possible explanation of the success in Test II may lie in the fact that it was a repetition of Test I. Practice effect was therefore present as in no other test.

In seeking another technique for objectively measuring rhythm with which Experiment I might be correlated, Experiment II was based upon the early experiments of Marey reported under earlier studies. Marey's photographs showed that there is a cycle of movements in walking, running, and jumping. The rhythmic repetition of such cycles could be studied by measuring the ratio of the stride from the right to the left foot with the stride from the left to the right. When many measurements have been made, the mean ratio and the average deviation from the mean is computed. If the cycle of movement is rhythmic, the ratio between parts of the cycle should be uniform and a low average deviation would indicate excellent rhythmic coordination.

Experiment II was carried out with the same fifteen students used in Experiment I. The technique required students to pass with bare feet over a pathway of sprinkled flour while a Victrola set the tempo. Three tests were used: running, hopping and a pattern of "step-hop, step-hop, run, run, run, run." The average deviation from the mean ratio between a stride (R to L) and (L to R) was computed from measurement of the distances between imprints of the great toe. In running and hopping, some subjects were able to ignore the *tempo of the Victrola* and maintained a *natural* tempo with a low average deviation from the mean ratio between strides. In the more difficult coordination of hopping within a pattern of movement, students were unable to continue *mechanically in a natural* rhythm. Certain subjects were found to lack the ability to adapt to an imposed tempo when confusion in their coordination of arms and legs forced them to make an effort to follow the Victrola.

The correlation between the two techniques used in Experiments I and II was .91 with a probable error of .03 by the method of rank differences. This was the correlation between the total scores made on the machine and success in hopping in the pattern of hopping and running. Although the experimental group included only 15 students, such a high correlation indicates that the 2 techniques tended to measure the same thing. In both experiments success was particularly identified with adap-

tation to an imposed tempo. The correlation of .91 with a probable error of .03 may be interpreted to mean that both techniques tested not only rhythm but motor response in a set tempo.

Conclusions from Measurement of Motor Response.—The purpose in objectively measuring the motor response in rhythm was: "(1) to furnish a basis for the classification of students enrolling for elementary and advanced sections of folk dancing and (2) to eliminate from groups majoring in physical education those whose poor motor response in rhythm will handicap their success."

The techniques of Experiment I and II require too long a time for each individual to be practical for *large* groups. Testing by either or both methods should be used with extreme cases. Enrollment in classes is therefore recommended on the basis of earlier experience in the study of rhythm. Within the elementary group, there will be found occasional students extremely weak. In the advanced sections will be found students who are gifted. These students should be tested with a view to the perfection of the techniques for measurement of achievement with the average student.

With regard to the elimination of students from the group majoring in physical education, the techniques should not be so used but rather as a basis for advice. Students have been found to rate very low according to both techniques but because of other qualities, they have been successful in athletics. The conclusion is therefore that again extreme cases should be tested and those majors who are weakest be followed with periodic use of the tests. Instead of elimination from the group, every effort should be made to balance their athletic and rhythmic ability.

Since this study was undertaken, an increasing interest in education is partially due to economy measures. Many exaggerated claims have been made by enthusiastic instructors of the activities in expensively equipped gymnasiums. Many doubts have arisen among administrators regarding the maintenance of large staffs and upkeep of vast athletic fields and special buildings. The final conclusion of this study is that an increasing amount of objective measurement of results must be undertaken in every phase of physical education. This study has been a sincere effort to improve the writer's instruction in folk dancing classes for women in a university and thereby increase the values received by the students. With the presentation of a background for the dances in folk lore, cultural values have been secured as shown in the objective measurement of knowledge. The influence upon attitude toward foreign people has been found doubtful. The opportunity for measurement of motor response in rhythm has been developed through two techniques. It is in the further use of those techniques and the development of other methods for measuring motor coordination that the study of folk dancing as a form of rhythmic expression may be demonstrated most valuable.

In the objective measurement of a knowledge of folk lore, a new text-

book by the writer was used as a basis for objective examinations. A limited number of nationalities are represented in that text. Similar material describing settings for folk dances and bibliographies on closely related folk art, music, drama, legend, costumes, and customs should be collected on other nationalities to supplement the teaching of dances in many collections.

In the objective measurement of attitudes toward foreign people, the results of this study show the necessity for a much more controlled situation and larger number of subjects. Further study requires a form which focuses attention upon a very specific aspect of attitude toward other nationalities.

In the objective measurement of motor response in rhythm the technique using an experimental machine should be changed in further research. A second revolving drum should be used with much longer strips of the recording paper passing over two drums. This would permit more repetitions of the pattern of movement. In such extensive sampling, the reliability of the data would be increased. Preliminary practice before tests on the machine should be standardized. The tests should range from extremely simple patterns through more difficult coordinations than those used in this study. It would be interesting to have emphasis placed upon differences in rate of learning new coordinations. For such a study of learning rhythmic patterns, very extreme cases should be used.

Further study with the experimental machine should emphasize *self-testing* among university women. Individual differences in natural rhythm should be studied with no imposed tempo. The influence of different tempos upon the onset of fatigue would be an interesting study at different age levels.

During the spring of 1932, the University of Chicago eliminated the requirement that students shall enroll for physical education. Those who do enroll receive no units of credit. In the University of Minnesota an experiment was carried on during 1932–33 with large controlled and experimental groups. A comparison of the two groups at the close of one year attempted to determine whether the experimental group which was registered for a physical education requirement had gained values which were not gained by the controlled group who did not register for physical education.

The elimination of the requirement of physical education, and the experimental study referred to, are the result of a feeling that departments of required physical education are being maintained at an expense which cannot be justified in the tangible evidence of beneficial results. In an effort to produce tangible evidence, objective measurement *must* be developed. The writer has found that almost no objective measurement has been attempted to justify courses in folk dancing for university women. The present study is an effort to offer such evidence of success in the teaching of folk dancing. The results warrant continued use of tests of a

knowledge of folk lore in order to introduce cultural aspects. Continued use of measurement of motor response in rhythm is recommended. Measurement of attitudes and claims regarding the possibilities of affecting personality are not as clearly demonstrable.

IV

BIBLIOGRAPHY

I. *Objective Measurement of a Knowledge of Folk Lore.*

DeWindt, R. D. "A Method of Teaching Folk Dancing." *The Journal of Health and Physical Education*, I:5 (May, 1930), 36.

Douglass and Spencer. "Is It Necessary to Weight Exercises in Standard Tests?" *Jour. of Educ. Psych.*, 14, 1923, 109–112.

Elliott, R. "Modern Trends in Physical Education." RESEARCH QUARTERLY, I: 2 (May, 1930), 74–85.

Evans, B. and Evans, M. G. *American Indian Dance Steps.* New York: A. S. Barnes and Company, 1931.

Frost, Helen. *Oriental and Character Dances.* New York: A. S. Barnes and Company, 1931.

Haynes, W. D. "Theory and Practice in Folk Dancing." *The Journal of Health and Physical Education*, I:8 (October, 1930), 22.

Kwalwasser, Jacob. *Tests and Measurements in Music.* New York: C. C. Birchard and Co., 1927.

Ruch, G. M. *The Objective or New Type Examination.* New York: Scott, Foresman and Company, 1929.

Ruch, G. M. and Stoddard, G. D. *Tests and Measurements in High School Instruction.* Yonkers-on-Hudson: World Book Company, 1927.

Shambaugh, M. E. *Folk Festivals for Schools and Playgrounds.* New York: A. S. Barnes and Company, 1932.

Symonds, P. M. *Measurement in Secondary Education.* New York: The Macmillan Company, 1924.

Symonds, P. M. "Notes on Rating." *Jour. App. Psych.*, 9, 1925.

Thorndike, E. L. *Adult Learning.* New York: The Macmillan Company, 1928.

Thorndike, E. L. *Human Learning.* New York: The Century Company, 1931.

Williams, J. F., Dambach, J. I., and Schwendener, N. *Methods in Physical Education.* Philadelphia: W. B. Saunders & Co., 1932.

II. *Objective Measurement of Attitudes Toward Foreign People.*

Bain, Read. "Theory and Measurement of Attitudes and Opinions." *Psychological Bulletin*, 27:357–79, (May, 1930).

Bernreuter, R. G. *Personality Inventory.* Stanford University Press, 1931.

Bogardus, E. S. *Fundamentals of Social Psychology.* New York: The Century Company, 1924.

Bogardus, E. S. *Immigration and Race Attitudes.* Boston: D. C. Heath and Co., 1928.

Bogardus, E. S. "Measuring Social Distances." *Journal of Applied Sociology*, 9:299–308, (March, 1915).

Bogardus, E. S. "Race Friendliness and Social Distance." *Journal of Applied Sociology*, 1927, Vol. II, 272–87.

Bogardus, E. S. "Social Distance and Its Origins." *Journal of Applied Sociology*, Vol. 9, 216–26.

Davis, Jerome. "Testing the Social Attitudes in the Government Schools of Russia." *American Journal of Sociology*, Vol. 32, 1927, 947–52.

Diggens, E. A. *A Statistical Study of National Prejudices*, Master's Essay. Columbia University Press, 1927.

Frederick, Robert. "An Investigation into Some Social Attitudes of High School Pupils." *School and Society*, (April 2, 1927).

Garth, T. R. *Race Psychology*. New York: McGraw-Hill Book Company, 1931.

Harper, Heber R. *A Study of Opinions, Feelings and Attitudes Concerning Some International Problems*. Copyrighted, 1929, by H. R. Harper.

Harper, Heber Reed. *What European and American Students Think on International Problems*. p. 255, New York: Teachers College, Columbia University, 1931.

Harper, Manly. "A Test of Social Beliefs and Attitudes of American Educators." *Contribution to Education No. 234*, Columbia University, 1925.

Hartshorne, Hugh, and May, Mark A. *Studies in Service and Self-Control*. New York: The Macmillan Company, 1930.

Hartshorne, Hugh, and May, Mark A. *Studies in the Organization of Character*. New York: The Macmillan Company, 1931.

Hartshorne, Hugh, and May, Mark. *Studies in Deceit*. New York: The Macmillan Company, 1930.

Indiana University, School of Education, "Education for World Friendship." Bulletin undated.

Lasker, B. "Childhood Prejudices." *Child Study*, 6:107–9 (February, 1929).

Lasker, Bruno. *Race Attitudes in Children*. New York: Henry Holt and Company, 1929.

Maller, J. B. *Character and Personality Tests*. New York: Bureau of Publications, Teachers College, 1932.

May, Mark A., Hartshorne, Hugh, and Welty, Ruth E. "Personality and Character Tests." *Psychological Bulletin*, 27:485–94, (June, 1930).

May, Mark A, and Hartshorne, Hugh. "First Step Toward a Scale for Measuring Attitudes." *Jour. of Ed. Psych.*, 17 (1926), 145–162.

Meltzer, Hyman. "Children's Social Concepts." *Contribution to Education No. 192*, Columbia University, 1925.

National Education Association, Department of Superintendence, "Character Education." p. 536. *Tenth Yearbook*. Washington, D. C.: The Association, 1932.

National Education Association, Committee on Character Education, "Character Education." U. S. Dept. of Interior, Bureau of Education, *Bulletin, 1926, No. 7*, Washington, D. C.: Government Printing Office, 1926, Ch. 5, "Character Tests and Measurements," pp. 35–48.

Newmann, G. B. "A Study of International Attitudes of High School Students." *Contributions to Education No. 239*, Columbia University, 1927.

Orato, Pedro. "Experimental Investigation to Determine Relative Effects of Various Factors upon Race Prejudice." *Welfare Magazine*, 1927, Vol. 18, 766–795.

Palmer, Irene, *Tests and Measurements: A Workbook in Health and Physical Education*, New York: A. S. Barnes and Co., 1932. Ch. 32—"Tests of Attitudes."

Ragsdale, C. E. *Modern Psychologies and Education*. New York: The Macmillan Company, 1932. Ch. 14—"Physical and Health Education."

Ragsdale, Clarence E. *The Psychology of Motor Learning*. Syllabus for a course at the University of Wisconsin.

Roback, A. A. *A Bibliography of Character and Personality*, p. 340. Cambridge, Mass.: Sci-Art Publishers, 1927.

Rosander, A. C. "Can Attitudes be Measured?" *Phi Delta Kappan*, (October, 1930).

Sturges, H. A. "The Theory of Correlation Applied in Studies of Changing Attitudes." *American Journal of Sociology*, Vol. 33, 1927.

"Study of Prejudice." Alpha Gamma Chapter at Boston University, *Pi Lambda Theta Journal* (Dec., 1931).

Symonds, P. M. *Diagnosing Personality and Conduct*. New York: The Century Co., 1931.

Symonds, Percival M. "The Present Status of Character Measurement." *Journal of Educational Psychology*, 15:484–98 (November, 1924).

Symonds, P. "A Social Attitudes Questionnaire." *Journal of Educational Psychology*, 16 (1925), 316–322.

Thomas, W. I. "Psychology of Race Prejudice." *American Journal of Sociology*, Vol. 9 (1904), 593.

Thurstone, L. L. "Attitudes Can Be Measured." *American Journal of Sociology*, 33 (1928), 531.

Thurstone, L. L., and Chase, E. J. *Measurement of Attitude*, University of Chicago Press, 1929.

Thurstone, L. L. "Measurement of Opinion." *Jour. of Abn. and Social Psych.*, Vol. 12 (1928), 415–30.

Thurstone, L. L. "A Scale for Measuring Attitude Toward the Movies." *Journal of Educational Research*, (Sept., 1930), 89–95.

Thurstone, L. L. "Scale of Preferences for Twenty-one Nationalities, An Experimental Study of National Preference." *Jour. of General Psych.*, (1928).

Watson, Goodwin B. "Does World-Mindedness Depend Upon Good Will or Information? Upon Character or Intelligence?" Undated reprint from Columbia University.

Watson, Goodwin. "The Measurement of Fair-Mindedness." *Contributions to Education No. 176*. Columbia University, 1925.

Watson, Goodwin B. "Tests of Personality and Character." *Review of Educational Research*, (June, 1932), Vol. II, No. 3, American Educational Research Association, Washington, D. C.

Young, Donald. "Some Effects of a Course in American Race Problems in the Race Prejudice of 450 Undergraduates." *Jour. of Abn. and Soc. Psych.* (1927), 22, 235–42.

Young, Kimball. "Topical Summaries of Current Literature: Personality Studies." *American Journal of Sociology*, 32:953–71 (May, 1927).

Zeleny, L. D. "A Measure of Social Opinions of Students." *Journal of Applied Sociology*, Vol. II, (1926).

III. *Objective Measurement of Motor Responses in Rhythm.*

Annett, Thomas. "A Study of Rhythmical Capacity and Performance in Motor Rhythm in Physical Education Majors." RESEARCH QUARTERLY, III:2 (May, 1932), 183–191.

Baldwin, B. T., and Stecher, L. J. *The Psychology of the Preschool Child*. pp. 141–145. New York: D. Appleton and Company, 1924.

Brace, D. K. *Measuring Motor Ability*. New York: A. S. Barnes and Company, 1926.

Burnside, L. H. "Coordination in the Locomotion of Infants." *General Psych. Monographs*, (1927), Vol. 2, No. 5, 284–372.

Cunningham, Bess. "An Experiment in Measuring Gross Motor Development of Infants and Young Children." Institute of Child Welfare, Teachers College, *Jour. of Ed. Psych.*, 1927, 18, 458–464.

De Graff, Lulu H. *The Norms of the Sensitiveness to Rhythm*. Master's Thesis, 1924. University of Iowa.

Espenschade, Anna. An Experiment in Testing the Motor Ability of Pre-School Children. Unpublished manuscript.

Garfiel, Evelyn. "The Measurement of Motor Ability." *Archives of Psychology*, (April, 1923).

Gates and Taylor. "The Acquisition of Motor Control." *Teachers College Record*, 459–468, 1927, 24.

Glassow, R. B. *Fundamentals of Physical Education*. Philadelphia: Lea and Febiger, 1932.

Goodenough, Florence, and Anderson, John. *Experimental Child Study*. New York: The Century Co., 1931.

Goodenough, F. L., and Brian, C. R. "Certain Factors Underlying the Acquisition of Motor Skills." *Journal of Experimental Psychology*, (1927), 12, 127–55.

Griffith, Coleman R. "Timing as a Phase of Skill." *Jour. of Educational Psychology*, (March, 1932), Vol. 23, No. 3, 204.

Hull, C. L. *Aptitude Testing*. Yonkers-on-Hudson: World Book Company, 1928.

Klauer, Neomi J. *The Effect of Training in Rhythm Upon Rhythmic Discrimination in the Intermediate Grades*. Master's Thesis, 1924, University of Iowa.

Heinlein, C. P. "A New Method of Studying the Rhythmic Responses of Children Together with an Evaluation of the Method of Simple Observation." *Journal of Genetic Psychology*, Vol. 36, No. 2 (June, 1929), 205–229.

Kwalwasser, Jacob. "The Measurement of the Sense of Rhythm." *Musical Observer*, (June, 1924).

Luciani, Luigi. "Human Physiology." Vol. III, *Muscular and Nervous Systems*. Translated by Frances A. Wolby. London: Macmillan and Company, 1915.

McGinnis, Esther. "The Acquisition and Interference of Motor Habits in Young Children." *Genetic Psychology*, Monograph, 1929, 6, No. 3, 209–311.

Morgan, John J. B. *Child Psychology*. Richard R. Smith, 1931.

Patterson, D. G., Elliott, R. M., Anderson, L. D., Toops, H. A., and Heidbreder, E. *Minnesota Mechanical Ability Tests*. University of Minnesota Press, Minneapolis, 1930.

Randall, Florence Clarke, and Anderson, Norma M. *An Experimental Study of Factors Which Influence Speed in Running*. Master's Thesis, University of Wisconsin, 1931.

Schäfer, E. A. *Text Book of Physiology*. New York: Macmillan Company, 1900.

Scheideman, Norma. *Psychology of Exceptional Children*. New York: Houghton, Mifflin Company, 1931.

Seashore, Robert H. "Individual Differences in Motor Skills." *Journal of General Psychology*, (1930), 3, 38–66.

Seashore, Robert H. "Stanford Motor Skills Unit." *Psychological Monographs*, University of Iowa Studies in Psychology No. 12, Seashore Commemorative Number.

Shelly, Mary Jo. "Some Aspects of the Case For and Against Objective Testing of the Dance in Education." RESEARCH QUARTERLY, I: 3, (October, 1930), 119–126.

Sherman, M., and I. C. *Process of Human Behavior*. New York: W. W. Norton and Company, 1929.

Sherrington, C. S. *Integrative Action of the Nervous System*. New Haven: Yale University Press, 1926.

Stupp, Lillian L. *A Correlation of Musical Ability and Dancing Ability*, Master's Thesis, University of Wisconsin, 1922.

Twenty-Eighth Yearbook, National Soc. for Study of Education. *Pre-School and Parental Education*, Part II, Ch. II—"Studies of Motor Development."

Wellman, B. "The Development of Motor Coordination in Young Children: An Experimental Study in the Control of Hand and Arm Movements." *University of Iowa Studies in Child Welfare*, III: 2, 51.

Wellman, B. "Significant Factors in the Motor Coordination of Young Children." *Psych. Bull.*, 25 (1928), 178–179.

IV. *References on Definition and Analysis of Rhythm.*

Bolton, T. L. "Rhythm." Worcester, 183, *Am. Jour. of Psych.*, 6, 1894, 145–238.

Dixon, E. T. "On the Difference of Time and Rhythm in Music." *Mind*, n.s. 4, 1895, 236–9.

Dunlap, K. "New Rhythm and Time Device." *Science*, n.s., 26, 1907, 257–8.
Dunlap, K. "Reactions to Rhythmic Stimuli with Attempt to Synchronize." *Psych. Rev.*, 17, 1910, 319–35.
Dunlap, K. "Rhythm and Time." *Psych. Bull.*, 8, 1911, 239–42.
Hall, G. S., and Jastrow, J. "Studies in Rhythm." *Mind*, 11, 1886, 55–62.
Hall, W. W. "The Time Sense." *J. Ment. Science*, 1927, 73, 421–28.
H'Doubler, Margaret. *Rhythmic Form and Analysis*. University of Wisconsin.
Isaacs, E. "The Nature of the Rhythm Experience." *Psych. Rev.*, 28, 270, 1920.
MacDougall, R. "The Structure of Simple Rhythm Forms." *Harvard Psych. Stud.*, 1, 1903, 309–416, *Monograph Supp. Psychol. Rev.*, 4, 1903, 309–16.
MacDougall, R. "Rhythm, Time and Number." *Am. Jour. of Psych.*, 13, 1902, 88–97.
Maguire, H. "First Thought on Rhythm." *Musician*, 15, 1910, 844.
Miner, J. B. "Motor, Visual, and Applied Rhythms." *Psychological Review Monograph*, Vol. 5, No. 21, 1903.
Myers, C. S. "A Study of Rhythm in Primitive Music." *Brit. Jour. of Psych.*, 1, 1905, 397–406.
Osgood, M. "In the Classroom; Upon Rhythm." *Musician*, 15, 1910.
Penfield, S. N. "Rhythm, Its Origin and Development." *Musician*, 17, 1912, 161.
Pfefferkorn, O. W. G. "Rhythm, A Disturbing Nomenclature in Music Study." *Musician*, 14, 1909, 262.
Ruckmick, C. A. "The Rôle of Kinaesthesis in the Perception of Rhythm." *Am. Jour. of Psych.*, Reprint of Doctor's Thesis, Vol. 24, 305–519.
Ruckmick, C. A. "The Rhythmical Experience from the Systematic Point of View." *Am. Jour. of Psych.*, 1927, 39, 356–66.
Sanford, E. C., and Triplett, N. "Studies of Rhythm and Meter." *Am. Jour. of Psych.*, 12, 1901, 361–87.
Schoen, Max. "Rhythm." *Jour. of Comp. Psych.*, Vol. 5, No. 1, February, 1925.
Sears, C. H. "Studies in Rhythm." *Ped. Sem.*, 8, 1901, 1–44.
Sears, C. H. "A Contribution to the Psychology of Rhythm." *Am. Jour. of Psych.*, 13, 1902, 28–61.
Seashore, C. E. *Psychology of Musical Talent*. New York: Silver Burdett and Co., 1919.
Sonnenschein, E. A. *What is Rhythm?* Broad Street, Oxford: Basil Blackwell, 1925.
Squire, C. R. "A Genetic Study of Rhythm." Worcester, 1901, *Am. Jour. of Psych.*, 12, 1901, 492–589.
Stetson, R. H. "The Teaching of Rhythm." *Musical Quarterly*, Vol. 9, 181–190, 1923.
Stevens, L. T. "On the Time-Sense." *Mind*, 11, 1886, 393–404.
Swindle, P. F. "On the Inheritance of Rhythm." *Am. Jour. of Psychol.*, 24, 1913, 180–203.
Wallaschek, R. *Primitive Music*, London: Longmans, 1893.

The Utilization of McCloy's Athletic Index with the California Achievement Scales

By KARL W. BOOKWALTER
Critic and Instructor, Indiana University, Bloomington, Indiana

THE STATE of California has made a marked contribution to the programs of physical education for elementary school and junior high school boys and girls. This contribution is in the form of the new state textbook, *Achievement Scales in Physical Education Activities.* These scales were established by N. P. Neilson and Frederick W. Cozens, and published by the California State Department of Education, Sacramento, 1934.* The validity of these scales is unquestionably sound as the authors are known for their splendid work in the fields of organization and measurement in physical education.

One other leader in the field of measurements in physical education, Charles Harold McCloy, has made a similar contribution in his recent book, *The Measurement of Athletic Power.* This book, published by A. S. Barnes, New York, 1932, contains a wide selection of activities, rules for their organization, and scoring tables established by most sound statistical procedures. These scales have a general utility in that they may be utilized for children in practically all levels of education. The formula for the computation of the "Athletic Index" has been derived with meticulous pains. This formula, $20A + 6H + W$ (in which A is the age in years, to the nearest half year, H is the height to the last full inch, and W is the weight of the pupil) when utilized with Table I[1] for the quick computation of a pupil's index, has decided values, those of economy of teacher time and simplicity.

For the average teacher of physical education in the elementary and junior high schools the California scales have an advantage in that norms or scales of performance for several classes of pupils are ready to use. These classes, eight in number, are established upon readily obtained data, namely the height, weight, and age of the pupils. To work out local norms for these classes would require time and effort not usually available to the average teacher. For all practical purposes the California scales would be satisfactory to stimulate pupil interest in the activities, or for a basis of evaluating a portion of the pupil's achievement in the

* Also published by A. S. Barnes and Co., 1935.

1 C. H. McCloy, *The Measurement of Athletic Power*, p. 119. New York: A. S. Barnes and Co., 1932.

whole physical education program, for any school in the United States. On the other hand McCloy's formula for computing athletic indices has two advantages over the California tables for classifying pupils, namely economy of time and greater objectivity (accuracy in computation). These are important factors for the busy teacher. The authors of the California classification scheme claim a high correlation with McCloy's formula. It has seemed desirable therefore to establish divisions for classification by McCloy's formula which will be comparable to those used in the California Achievement Scales. The following charts graphically represent the results of such an attempt.

Eight hundred and seven boys were classified by McCloy's formula and also by the California Classification for Boys and Girls.[2] Though no comparable data have been obtained for girls it is reasonable to expect that the classes would hold for girls since both authors suggest their classification schemes for the classification of both boys and girls. Only a study similar to the present one could validate this hypothesis however. The data below are self-explanatory.

CLASSIFICATION EQUIVALENTS McCLOY

California

H = 825–Over
G = 790–824
F = 755–789
E = 720–754
D = 685–719
C = 650–684
B = 615–649
A = Up to 614

SCATTERGRAM
California

McCloy's A.I.

						3	76
					6	46	5
				8	51	8	
			9	45	8		
		14	67	6			
	12	71	8				
12	113	11					
215	13						

From the frequency tables it can be seen that there is a slight overlapping of the several classes. On the other hand there is an 84.1 per cent agreement of the two systems of classification. The lines determining the step intervals in McCloy's scores were established by finding those points at which the number of cases which overlapped the class above most nearly equalled the number of cases which overlapped the class below. It will be noted that the step intervals suggested for McCloy's system are thirty-five points apart, for classes *B* to *G* inclusive. This fact was not empirically determined but resulted from the data. This phenomenon would be expected when one observes that the

[2] N. P. Neilson and Frederick W. Cozens, *Achievement Scales in Physical Education Activities for Boys and Girls in Elementary and Junior High Schools*, p. 6. New York: A. S. Barnes and Company, Inc., 1935.

DATA OBTAINED FROM BLOOMINGTON, INDIANA, CITY SCHOOLS
FOURTH TO TWELFTH GRADES

Intervals	California Ht-Wt-Age Classification								Intervals	California Ht-Wt-Age Classification							
McCloy's Athletic Index	A	B	C	D	E	F	G	H	McCloy's Athletic Index	A	B	C	D	E	F	G	H
905–Above								5	680–684			6	6				
900–904								0	675–679			6	1				
895–899								1	670–674			8	1				
890–894								4	665–669		1	13					
885–889								2	660–664		2	13					
880–884								6	655–659		2	10					
875–879								3	650–654		7	15					
870–874								4	645–649		14	7					
865–869								3	640–644		17	3					
860–864								5	635–639		13	1					
855–859								7	630–634		24						
850–854								9	625–629	1	12						
845–849								6	620–624	4	15						
840–844								5	615–619	7	18						
835–839							1	9	610–614	17	6						
830–834							1	5	605–609	22	7						
825–829							1	2	600–604	20							
820–824							4	2	595–599	15							
815–819							10	1	590–594	21							
810–814							4	1	585–589	18							
805–809							9	1	580–584	14							
800–804						3	4		575–579	19							
795–799						2	10		570–574	16							
790–794						1	5		565–569	18							
785–789						5	5		560–564	11							
780–784						12	2		555–559	11							
775–779						7	0		550–554	9							
770–774					1	8	0		545–549	1							
765–769					1	6	0		540–544	0							
760–764					1	7	1		535–539	0							
755–759					5	6			530–534	2							
750–754					3	4			525–529	0							
745–749					3	1			520–524	0							
740–744					5	3			515–519	0							
735–739				1	4				510–514	0							
730–734				2	13				505–509	0							
725–729				0	10				500–504	1							
720–724				6	7												
715–719				9	5				TOTALS	227	138	96	84	59	65	57	81
710–714				6	1												
705–709				8													
700–704				13													
695–699			4	13													
690–694			2	8													
685–689			8	10													

Grand Total (Boys Only) 807 Cases

% of agreement 84.1

California system[3] has correspondingly regular step intervals for the same classes (save the next to the largest one).

The amount of agreement of these two systems can be made even more satisfactory than it is evidenced by these figures. If the teacher, after all the pupils are classified by McCloy's formula and into the divisions suggested in this article, will place all the pupils according to their classification and by practical observation change the obviously misclassified pupils to the class above or below the one in which the data have placed them, injustices can be avoided. This pragmatic regrouping should reduce overlapping cases to a minimum.

It is acknowledged that the number of cases utilized in this study is small but again the accompanying charts will show how satisfactory the results are from a practical standpoint. Should greater reliability be desired it would be a simple matter for any city school system to utilize the same methods herein discussed to establish their divisions more reliably than were the present ones.

[3] *Ibid.*

A Classified List of Current Periodicals in the Fields of Athletics, Health, Physical Education, and Sports Published in the United States and Canada

Compiled by ALETHA B. REDMAN

Reference Assistant, Serials Department, State University of Iowa Libraries

NOTE: Periodicals in the fields of hunting, fishing, horse racing, motoring, and similar sports have been intentionally omitted from this list. The information given includes title of periodical, date of founding, frequency of publication, subscription price, and publisher's address. In a number of cases the information as to date of founding and subscription price is not given. In many such cases, as with publications of state departments of health, the periodical may be obtained gratis. If the periodical is indexed, the name of the indexing service is given. Special features, as bibliographies, abstracts, and book reviews, are included wherever such information could be obtained. Pretention neither to completeness nor selectiveness is claimed for this list, but it is hoped that it is sufficiently comprehensive to be of some value to teachers and students in these fields. The miscellaneous section at the end of the list includes a few titles of periodicals in related fields which may be found useful to those who wish to keep up on current information.

In compiling this list free use has been made of such aids as Ayer and Son's *American Newspaper Annual and Directory, 1934*; Ulrich, *Periodicals Directory, 1932*; Severence, *Guide to the Current Periodicals and Serials of the United States and Canada*, 5th ed., 1931; various small lists; and the periodicals, *Author and Journalist, Bulletin of Bibliography, Bulletin of the New York Public Library*, and *The Writer*.

ABBREVIATIONS

Abstr.	m.	Ind. Arts
abstracts	monthly	*Industrial Arts Index*
Bibl.	q.	Int. Ind.
Bibliographies	quarterly	*International Index to Periodicals*
Bk. rev.	s-a.	Mag. Sub. Ind.
book reviews	semi-annually	*Annual Magazine Subject Index*
a.	s-m.	P.A.I.S.
annually	semi-monthly	*Public Affairs Information Service Bulletin*
bi-m.	s-w.	
bi-monthly	semi-weekly	Q.C. Ind. Med.
d.	w.	*Quarterly Cumulative Index Medicus*
daily	weekly	R.G.
fortn.	Educ. Ind.	*Readers' Guide to Periodical Literature*
fortnightly	*Education Index*	
irreg.	Eng. Ind.	
irregular	*Engineering Index*	

AQUATICS

Boating, Canoeing, Yachting

BOAT CLUB NEWS. 1926. m. $2. Cliff Warner, Publisher, 35016 Michigan Ave., Wayne, Mich.

CANADIAN BOATING AND COTTAGERS' MAGAZINE. 1929. bi-m. $2. Hugh C. MacLean Publications, Ltd., 347 W. Adelaide St., Toronto, Ont.

CANADIAN MOTOR-BOAT. 1910. m. $2. Canadian Motor-Boat, Ltd., 60–62 Adelaide St., E., Toronto, Ont.

CHICAGO YACHTING NEWS. 1933. $1. Chicago Yachting News, Navy Pier, Chicago, Ill.

MODEL YACHTING AND THE MODEL YACHT; a printcraft publication for model yachtmen. 1930. m. $2. Model Yachting, Melrose Highlands, Mass.

MOTOR BOATING. 1907. m. $2. Indexed: Eng. Ind. International Magazine Co., 958 Eighth Ave., New York, N.Y.

PACIFIC COAST YACHTING. 1924. m. $2.50. Pacific Coast Yachting, Los Angeles, Calif.

PACIFIC MOTOR BOAT. 1908. m. $3. Consolidated Publishing Co., 71 Columbus St., Seattle, Wash.

POWER BOATING. 1905. m. $2. Penton Publishing Co., Penton Bldg., Cleveland, Ohio.

RUDDER. 1890. m. $3. Indexed: Eng. Ind. Rudder Publishing Co., Inc., 9 Murray St., New York, N.Y.

SPORTSMAN. 1927. m. $4. Sportsman Publishing Co., Inc., 8 Arlington St., Boston, Mass.

WATER MOTORING. 1928. m. $1. Water Motoring, Tribune Tower, Chicago, Ill.

WATER SPORTS. 1911. m. $1.50. Hankel Printing Co., 314 W. Superior St., Chicago, Ill.

WESTERN CANADA POWER BOAT. 1930. m. $3. Mitchell Printing and Publishing Co., Ltd., 1037 W. Pender St., Vancouver, British Columbia.

YACHTING. 1907. m. $4. Yachting, Inc., 205 East 42nd St., New York, N.Y.

YACHTSMAN AND ASSOCIATED SPORTSMAN. 1929. San Francisco, Calif.

Diving, Swimming, Natatoria

BEACH AND POOL AND AQUATICS. 1927. m. $2. (Partly free distribution). Hoffman Publications, Inc., 404 Fourth Ave., New York, N.Y.

SHORE AND BEACH. 1933. q. $2. Shore and Beach, 318 Magazine St., New Orleans, La.

SWIMMER. m. $1.50. Swimmer Publishing Company, 2710 Morris Ave., New York, N.Y.

SWIMMING POOL BEACH OPERATION. 1932. m. $2. Swimming Pool Beach Operation, 10 E. 39th St., New York, N.Y.

ATHLETICS—SPORTS

Outdoor Activities, General Sports

A.C.E. 1919. m. $1.50. St. Paul Athletic Club, Fourth and Cedar Sts., St. Paul, Minn.

ALL OUTDOORS. 1927. m. $1. All Outdoors Publishing Co., Inc., Bryson Bldg., Los Angeles, Calif.

ALL SPORTS. 1929. All Sports, Inc., Cincinnati, Ohio.

ALL-AMERICA SPORTS MAGAZINE. 1933. m. $1.50. Nat Fleisher, Editor, Madison Square Garden Arcade, New York, N.Y.

AMATEUR ATHLETE. 1930. m. $1. Amateur Athlete, Suite 2742 Woolworth Bldg., New York, N.Y.

ARENA AND STRENGTH. 1929. m. $1.50. Milo Publishing Co., 2741 N. Palethrop St., Philadelphia, Pa.

ATHLETE AND SPORTSMAN. 1924. $2. Athlete and Sportsman, 190 E. Fulton St., Chicago, Ill.

ATHLETIC JOURNAL. 1920. m. (Sept.-Je.) $1.50. Athletic Journal Publishing Co., 6858 Glenwood Ave., Chicago, Ill.

BAHN FREI (Text in German and English). 1882. m. Membership. New York Turn-Verein, Lexington Ave. and 85th St., New York, N.Y.

BRIDLE AND GOLFER. 1921. m. $3. Edward Grace, Publisher, 1258 Washington Blvd., Detroit, Mich.

BRIDLE AND GOLFER. 1930. m. $4. Bridle and Golfer, Ltd., 156 Yonge St., Toronto, Ont.

BULLETIN (Washington, D.C.). 1894. Noon and evening. $20.80. United Publishing Co., 717 Sixth St., N W., Washington, D.C.

CARTELES (Spanish). 1919. w. $5. Sin-

dicate de Artes Graficas de la Habana, Avenidas de Almendaras y Calle Bruzon, Habana, Cuba.

CLEVELAND ATHLETIC CLUB JOURNAL. 1912. m. $2. Cleveland Athletic Club, 1760 E. Twenty-second St., Cleveland, Ohio.

CLUB LIFE. 1920. m. $2. Milwaukee Athletic Club, 758 Broadway, Milwaukee, Wis.

CLUB LIFE. 1931. m. $3. Neff, Stewart and Keith, Inc., 516 Chrysler Bldg., New York, N.Y. Bk. Rev.

COLORED BASEBALL AND SPORTS MONTHLY. 1934. m. $1. 79 W. 135th St., New York, N.Y.

COUNTRY CLUB MAGAZINE AND PACIFIC COAST GOLF AND MOTOR. 1911. m. $3. 355 S. Broadway, Los Angeles, Calif.

D.A.C. NEWS. 1916. m. $2.50 ($1 to members). Detroit Athletic Club, 241 Madison Ave., Detroit, Mich.

DOTAC. 1927. m. $2. Club Press, 149 Broadway, New York, N.Y.

GOLF AND SPORTS ILLUSTRATED. 1927. m. $3. H. R. Pickens, Publisher, 922 Victoria Square, Montreal, Quebec.

GOLFER AND SPORTSMAN. 1927. m. $1.50. Fawcett Publications, Inc., 529 S. Seventh St., Minneapolis, Minn.

GONDOLIER. 1925. (Jan.-March) $1.50. O. S. Parmer, Publisher, 715 Olympia Building, Miami, Fla.

GRAPHIC (English and Tagalog). 1927. w. $4.50. Ramon Roces Publications, Inc., P.O. Box 1625, Manila, P.I.

HARVARD ATHLETIC ASSOCIATION NEWS. 1927. w. $2. Harvard Athletic Association, Harvard University, Cambridge, Mass.

INTERCOLLEGIATE SPORTS. 1931. w. $3. Medal Publishing Corporation, 6 E. 39th St., New York, N.Y.

JOURNAL OF HEALTH AND PHYSICAL EDUCATION. 1896. m. (Sept.-Je.) $2. Indexed: Educ. Ind. Q.C. Ind. Med. American Physical Education Association, 311 Maynard St., Ann Arbor, Mich. Bk. rev.

LINTERNA. 1925. w. $5. Editorial Linterna, Inc., San Justo, No. 18, San Juan, Puerto Rico.

LOS ANGELES REFEREE. 1923. w. Los Angeles Referee, Suite 709–711 Broadway Arcade Building, Los Angeles, Calif.

M.A.A.A. MAGAZINE. 1923. m. Federated Press, Ltd., 1187 Bleury St., Montreal, Quebec

M.A.C. CANDLE. 1920. m. $2. Milwaukee Athletic Club, 444 Broadway, Milwaukee, Wis.

MERCURY. 1911. w. $1.50. Los Angeles Athletic Club, 431 W. Seventh St., Los Angeles, Calif.

METROPOLITAN SPORTSMAN. 1931. m. $2.50. New Jersey Sportsman, Inc., 189 Market St., Newark, N.J.

MIDWEST SPORTSMAN. 1928. m. $1. Midwest Sportsman, Kansas City, Mo.

NATIONAL SPORTSMAN. 1898. m. 50c. National Sportsman, Inc., 108 Massachusetts Ave., Boston, Mass.

NEWARK ATHLETIC CLUB NEWS. 1921. m. $2. Newark Athletic Club, 60 Park Rd., Newark, N.J.

NEW ORLEANS DAILY BULLETIN. 1922. d. except Sunday. $32. Joe Levy and Wm. Frederick, 540 Royal St., New Orleans, La.

NEW YORK STATE ATHLETIC COMMISSION. Bulletin. w. New York State Athletic Commission, New York, N.Y.

NEW YORK STATE PUBLIC HIGH SCHOOL ATHLETIC ASSOCIATION. Bulletin. 1926. New York State Public High School Athletic Association, Albany, N.Y.

NORTHERN SPORTSMAN. 1929. m. $1. Herbert C. Case Enterprises, Munising, Mich.

OLYMPIAN. 1906. m. $1. Olympic Club, 524 Post St., San Francisco, Calif.

PASADENA SPORTLAND. 1924. m. $2. Pasadena Athletic and Country Club, 405 E. Green St., Pasadena, Calif.

PENNAC. 1923. m. $2. Pennsylvania Athletic Club, Rittenhouse Square, Philadelphia, Pa.

REFEREE-ANNOUNCER. 1902. w. $5. Referee-Announcer, 960 Market St., San Francisco, Calif.

SCHOLASTIC COACH. 1931. m. (Sept.-May). Scholastic Corporation, 155 E. 44th St., New York, N.Y.

SITCH (Ukranian). 1918. s-m. $2. American Ukranian "Sitch" Athletic Association, 2406 W. Chicago Ave., Chicago, Ill.

SKYLINE. 1925. m. Dallas Athletic Club, Box 1092, Dallas, Texas.

SPORT. 1916. m. $2. Paul Gibbons, Inc., 506 Race St., Philadelphia, Pa.

SPORTING NEWS. 1927. w. $2. News Publishing Co., 318½ Notre Dame Ave., Winnipeg, Manitoba.

SPORTING NEWS. 1932. w. 75c. Claude Billings, Publisher, Akron, Ind.

SPORTS AFIELD AND TRAILS OF THE NORTHWOODS. 1887. m. $1. Sports Afield Publishing Co., 900 Phoenix Bldg., Minneapolis, Minn.

SPORTS MAGAZINE. 1931. Comfort Publishing Co., St. Louis, Mo.

SPORTSMAN. 1927. m. $4. Sportsman Publishing Co., Inc., 8 Arlington St., Boston, Mass.

SPORTSMAN'S DIGEST. 1922. m. 50c. Sportsman's Digest, 22 E. 12th St., Cincinnati, Ohio.

SPORTSMANSHIP. 1928. m. Sportsmanship, Inc., New York, N. Y.

SPUR. 1905. m. $4. Spur Publishing Co., Ltd., 515 Madison Ave., New York, N. Y.

SUNDAY PICTORIAL. 1929. w. (Jan.-March) $2.50. Sunday Pictorial Publishing Co., P. O. Box 365, Miami Beach, Fla.

TELEGRAPH. 1836. d. $24.50. Morning Telegraph, Inc., 345 W. Twenty-sixth St., New York, N. Y.

TOPICS. 1920. s-m. $5. Morristown Topics Corp., Morristown, N. J.

TOUT SPORT (French). 1927. m. $1. L'Agence Elite, Ltd., 40 Marguerite-Bourgois Ave., Quebec, Canada.

TOWN AND COUNTRY. 1846. s-m. $7.50. Stuyvesant Co., 572 Madison Ave., New York, N. Y. Bk. rev. Play rev.

TOWNSFOLK. 1924. m. $3. Townsfolk Company, 30 N. LaSalle St., Chicago, Ill.

TRI-COLOR. 1909. m. $3. Illinois Athletic Club, 112 S. Michigan Ave., Chicago, Ill.

TURF AND SPORT DIGEST. 1924. m. $3.50. Montee Publishing Co., Inc., 511 Oakland Ave., Baltimore, Md.

UNCLE JAKE SPORT NEWS. 1931. w. $3. Uncle Jake Sport News, 405 S. Poydras St., Dallas, Texas.

UNICORN. 1907. m. Athletic Association, Exeter St., Boston, Mass.

WINGED ACORN. Athens Athletic Club, Oakland, Calif.

WINGED FOOT. 1892. m. $2. New York Athletic Club, 180 Central Park, South, New York, N. Y.

WINGED HEAD. 1911. m. $2. Colonial Press, Inc., Pittsburgh, Pa.

Archery

ARCHERY REVIEW. 1931. m. $2. Archery Review Publishing Co., 1859 S. Boston St., Tulsa, Okla.

NATIONAL ARCHERY ASSOCIATION. BULLETIN. 1922. m. (Feb.-May) bi-m. (Je.-Nov.) National Archery Association, 616 Old South Bldg., Boston, Mass.

Baseball

BASEBALL MAGAZINE. 1908. m. $2. Baseball Magazine Co., 70 5th Ave., New York, N. Y.

BASEBALL NEWS. 1925. $4. Baseball News, 119 N. Dearborn St., Chicago, Ill.

BASEBALL WORLD. 1928. w. $7. Baseball World, Inc., 300 W. Adams St., Chicago, Ill.

COLLYER'S EYE AND BASEBALL WORLD. 1914. w. $7.50. Collyer's Publishing Co., Suite 829, 300 W. Adams St., Chicago, Ill.

COLORED BASEBALL AND SPORTS MONTHLY. 1934. m. $1. 79 W. 135th St. New York, N.Y.

SPORTING NEWS. 1886. w. $5. Sporting News Publishing Co., Tenth and Olive Sts., St. Louis, Mo.

Cricket

AMERICAN CRICKETER. 1877. m. $1.50. Associated Cricket Clubs of Philadelphia, 610 S. Second St., Philadelphia, Pa.

Football

ILLUSTRATED FOOTBALL ANNUAL. 1934. a. 25c. Fiction House, Inc., 461 Eighth Ave., New York, N. Y.

Golf

AMERICAN GOLFER. 1908. m. $3. Condé Nast Publications, Inc., Boston Post Rd., Greenwich, Conn.

CANADIAN GOLFER. 1914. m. $3. Canadian Lawn Tennis-Badminton, Ltd., 922 Victoria Square, Montreal, Quebec.

CANADIAN GOLFER. 1915. m. $4. Ralph H. Reville, Bank of Commerce Bldg., Brantwood, Ont.

CHICAGO GOLFER AND COUNTRY CLUB REVIEW. 1921. m. $2.50. North Shore Publishing Co., 236 N. Clark St., Chicago, Ill.

CLEVELAND CLUB LIFE. 1928. m. $2. Cleveland Club Life Co., 721 Bulkley Bldg., Cleveland, Ohio.

CLEVELAND DISTRICT GOLFER. 1913. m. $1. District Golfer, Inc., 1965 E. 66th St., Cleveland, Ohio.

COUNTRY CLUB MAGAZINE AND PACIFIC GOLF AND MOTOR. 1911. m. $3. Country Club Publishing Co., 1220 Maple Ave., Los Angeles, Calif.

GOLF ILLUSTRATED. 1914. m. $5. Golf Illustrated, Inc., 425 Fifth Ave., New York, N. Y. Bk. rev.

GOLFDOM, the business journal of golf. 1927. m. Free. Golfdom, Inc., 14 East Jackson Blvd., Chicago, Ill. *Golf club, course and shop management.*

GOLFER AND SPORTSMAN. 1927. m. $1.50. Fawcett Publications, Inc., 529 S. Seventh St., Minneapolis, Minn.

GOLFING. 1933. m. (Apr.-Aug.) Golfing, Inc., 205 W. Wacker Drive, Chicago, Ill.

GREENKEEPERS' REPORTER. 1933. m. $2. Greenkeepers' Reporter, Wayzata, Minn. *Golf course maintenance.*

MIDWEST GOLFER AND CLUB REVIEW. 1921. m. $2.50. North Shore Publishing Co., 14 E. Jackson Blvd., Chicago, Ill.

NATIONAL GREENKEEPER AND TURF CULTURE. 1927. m. $3. National Greenkeeper, Inc., 405 Caxton Bldg., Cleveland, Ohio. *Golf course management.*

PACIFIC COAST GOLFER. 1926. m. $5. Pictorial Publications, Inc., 212 Douglas Bldg., Seattle, Wash.

PROFESSIONAL GOLFER OF AMERICA. 1920. m. $2. Professional Golfers' Association of America, 150 Nassau St., New York, N. Y.

Horseshoe Pitching

HORSESHOE WORLD—The pitcher's journal. 1922. m. $1. Raymond B. Howard, Publisher, London, Ohio.

Polo

POLO; hunting, steeplechasing, horse shows; the magazine for horsemen. 1927. $5. Polo Magazine, Inc., 180 Madison Ave., New York, N. Y.

SPORTSMAN. 1927. m. $4. Sportsman Publishing Co., Inc., 8 Arlington St., Boston, Mass.

Soccer

SOCCER PICTORIAL WEEKLY. 1927. Soccer Pictorial Weekly, New York, N. Y.

SOCCER STAR. 1929. w. (Sept.-May) $4. Soccer Star Publishing Co., 145 Hudson St., New York, N. Y.

Tennis, Squash, Badminton

AMERICAN LAWN TENNIS. 1907. 15 times a year. $4. American Lawn Tennis, Inc., 500 Fifth Ave., New York, N. Y.

CANADIAN LAWN TENNIS AND BADMINTON. 1929. m. $2. Canadian Lawn Tennis and Badminton, Ltd., 922 Victoria Square, Montreal, Ont.

RACQUET. 1934. m. $2. Racquet, Inc., 1475 Broadway, New York, N. Y.

SPORTSMAN. 1927. m. $4. Sportsman Publishing Co., Inc., 8 Arlington St., Boston, Mass.

SQUASH-BADMINTON. 1933. m. (6 mo. of the year.) American Lawn Tennis, Inc. 500 Fifth Ave., New York, N.Y.

Winter Sports

SKATING. 1923. 4 times a year. $2. U. S. Figure Skating Association, 53 State St., Boston, Mass.

WINTER SPORTS. 1930. m. (Oct.-Apr.) $1. Winter Sports Publishing Co., 229 E. 79th St., New York, N. Y. Bk. rev.

CALISTHENICS

Gymnastics, Indoor Activities

AMERIKANISCHE TURNZEITUNG (German). 1885. w. $3. Turner Publishing Co., New Ulm, Minn.

KATOLICKY SOKOL (Bohemian). 1911. m. 50c. Bohemian Literary Society, Inc., 1611 S. 11th St., St. Louis, Mo.

KATOLICKY SOKOL (Slovak). 1911. w. $1.75. Majitil a Uytavatel, 205 Madison, St., Passaic, N. J.

SOKOL SOJEDINENIJA (American-Russian Falcon) (Slovak, Russian, English). 1913. w. $1.20. Greek Catholic Union, P. O. Box 312, Homestead, Pa.

Billiards

BILLIARDS MAGAZINE. 1913. m. $4. Bil-

liards Magazine, Inc., 35 S. Dearborn St., Chicago, Ill.

Bowling

BOWLERS DIGEST. 1932. w. $1. Times Transcript, Inc., 7319 Amboy Road, Staten Island, N. Y.

BOWLERS' JOURNAL. 1913. w. (mo. Je.-Aug.) $3. Bowlers Journal Co., 815 Exchange Ave., Chicago, Ill.

NATIONAL BOWLERS JOURNAL AND RECREATION AGE. m. 25c per copy. 360 N. Michigan Ave., Chicago, Ill.

Boxing

BOXING BLADE. 1919. w. $4. Boxing Blade, Inc., Sexton Bldg., Minneapolis, Minn.

BOXING NEWS. 1934. 10c per no. Boxing News, 83 Murray St., New York, N.Y.

ILLUSTRATED BOXING RECORD. 1894. s-m. $2. Pierce J. Hurley, 17 Spruce St., New York, N. Y.

JACK DEMPSEY'S FIGHT MAGAZINE. 1934. m. $3. Overland News Company, 1540 Broadway, New York, N. Y.

RING; WORLD'S FOREMOST BOXING MAGAZINE. m. $1.50. The Ring, Inc., 11 W. 42nd St., New York, N. Y.

CAMPING

CAMPING. 1923. m. (Oct.-Je.) $2. Camp Directors' Association, Lane Hall, Ann Arbor, Mich. Bk. rev.

DANCING

AMERICAN DANCER. 1933. m. $2.50. American Dancer, 101 West 58th St., New York, N. Y.

DANCING MASTER. 1894. m. (Oct.-Jl.) $3. American Dance Publications Co., 6609 Cottage Grove Ave., Chicago, Ill.

EUGENICS

EUGENICAL NEWS. 1916. bi-m. $3. Indexed: Q.C.Ind.Med. P.A.I.S. Science Press, Cold Spring Harbor, N. Y.

INTERNATIONAL WELFARE JOURNAL. 1888. q. 60c. International Purity Association, Inc., 127 N. Wells St., Chicago, Ill.

JOURNAL OF HEREDITY. 1910. m. $3.50. Indexed: Q.C.Ind.Med. American Genetic Association, 510 Victor Bldg., Washington, D. C.

PEOPLE. 1931. m. American Eugenics Society, 185 Church St., New Haven, Conn.

FOODS

Diet, Nutrition, Etc.

AMERICAN DIETETIC ASSOCIATION. JOURNAL. 1925. bi-m. $3. Indexed: Q.C. Ind.Med. American Dietetic Association, Room 821, 185 N. Wabash Ave., Chicago, Ill. Bibl. Bk.rev. Tech.

AMERICAN JOURNAL OF DIGESTIVE DISEASES AND NUTRITION. 1934. m. $6. American Journal of Digestive Diseases and Nutrition, 435-455 Lincoln Bank Tower, Fort Wayne, Ind. Abstr.

FORECAST, AMERICA'S LEADING FOOD MAGAZINE 1910. m. $2. Indexed: P.A.I.S. Forecast Publishing Company, 6 E. Thirty-ninth St., New York, N. Y. Bk.rev.

GOOD EATING. 1933. m. $2.50. 25 W. 43rd St., New York, N. Y.

HOW-TO-EAT. 1926. m. $3. How-To-Eat, Illinois Women's Athletic Club, 820 Tower Court, Chicago, Ill.

JOURNAL OF BIOLOGICAL CHEMISTRY. 1905. m. $5 per vol. American Society of Biological Chemists, Mount Royal and Guilford Aves., Baltimore, Md.

JOURNAL OF HOME ECONOMICS. 1909. m. (Sept.-Je.) $2.50. Indexed: R.G. Educ.Ind. P.A.I.S. American Home Economics Association, 101 East Twentieth St, Baltimore, Md. Abstr. Bk.rev.

JOURNAL OF NUTRITION. 1928. bi-m. $4.50. Indexed: Q.C.Ind.Med. American Institute of Nutrition, Inc., 36th St. and Woodland Ave., Philadelphia, Pa.

NUTRITION AND HEALTH NEWS. 1931. Physical Culture Institute of Nutrition, New York, N. Y.

PRACTICAL HOME ECONOMICS. 1923. m. $2. Indexed: Educ.Ind. P.A.I.S. Lakeside Publishing Co., 468 Fourth Ave., New York, N. Y.

HEALTH EDUCATION

Safety, Training, Etc.

AMERICAN JOURNAL OF PUBLIC HEALTH AND THE NATION'S HEALTH. 1911. m. $5. Indexed: Eng.Ind. P.A.I.S. Q.C. Ind.Med. R.G. American Public Health

Association, 470 7th Ave, New York, N. Y. Bibl. Bk.rev.

ARIZONA PUBLIC HEALTH NEWS. m. Arizona State Board of Health, Phoenix, Ariz.

BETTER HEALTH. 1920. m. $3. Medico-Dental Bldg., 490 Post St., San Francisco, Calif.

BIRMINGHAM'S HEALTH. m. Indexed: P.A.I.S. Jefferson County Board of Health, P. O. Box 2591, Birmingham, Ala.

BOSTON HEALTH BULLETIN. m. Health Department, Boston, Mass.

BULLETIN OF THE STATE BOARD OF HEALTH OF KENTUCKY. m. State Board of Health, Louisville, Ky.

CALIFORNIA PHYSICAL EDUCATION, HEALTH AND RECREATION JOURNAL. 1932. q. 75c for non-members. California Association of Health, Physical Education, and Recreation, 1110 South Fedora St., Los Angeles, Calif.

CANADIAN PUBLIC HEALTH JOURNAL. 1910. m. $2. Indexed: Q.C. Ind.Med. P.A.I.S. Canadian Public Health Association, 105 Bond St., Toronto, Ont.

CHASER. 1920. m. Texas Tuberculosis Sanitorium, Sanitorium, Texas.

CHICAGO'S HEALTH. w. Chicago Board of Health, Chicago, Ill.

COMMONWEALTH. Massachusetts Department of Public Health, Boston, Mass.

CONFIDANT. 1918. bi-m. $1. Locoma Publishing Co., 390 Cliff St., Battle Creek, Mich.

CONNECTICUT HEALTH BULLETIN. m. Connecticut State Department of Health, Hartford, Conn.

DISTRICT OF COLUMBIA HEALTH DEPARTMENT WEEKLY STATISTICAL STATEMENT. (mim.) District of Columbia Department of Health, Washington, D. C.

DR. TILDEN'S HEALTH REVIEW AND CRITIQUE. 1926. m. $1.50. Dr. J. H. Tilden, Denver, Colo.

EVERYBODY'S HEALTH. 1916. m. $1. Minnesota Public Health Association, 11 W. Summit Ave., St. Paul, Minn.

FLORIDA HEALTH NOTES. m. Florida State Board of Health, Jacksonville, Fla.

GOOD HEALTH. 1866. m. $2.50. Good Health Publishing Co., 271 West Main St., Battle Creek, Mich.

HEALTH. 1934. m. 29 Fifth Ave., New York, N.Y.

HEALTH AND LIFE. 1922. m. $2. Health and Life Publications, 504 S. Dearborn St. Chicago, Ill.

HEALTH BULLETIN. m. North Carolina Board of Health, Raleigh, N. C.

HEALTH BULLETIN FOR TEACHERS. 1929. Indexed: P.A.I.S. Metropolitan Life Insurance Co., School Health Bureau, Welfare Division, Newark, N. J.

HEALTH CULTURE. 1894. m. $2. Health Culture Co., 1133 Broadway, New York, N. Y.

HEALTH DIGEST. 1934. m. $3. 139 E. 36th St., New York, N.Y.

HEALTH EXAMINER. 1931. Greater New York Committee on Health Examination, New York, N. Y.

HEALTH HINTS. 1926. Tuberculosis Society, Clearfield, Pa.

HEALTH JOURNAL. 1919. Tuberculosis Association, Boston, Mass.

HEALTH MESSENGER. 1924. m. $1.50. Dr. J. D. Levine, Publisher, 162 North State St., Chicago, Ill.

HEALTH NEWS. w. New York Department of Health, Albany, N. Y.

HEALTH RAYS. 1919. m. $1.50. Health Rays Publishing Co., Kentville, Nova Scotia.

HEALTHY HOME. 1890. m. 3 yrs. for $1. W. H. Brock and Co., Athol, Mass.

HEALTHY HOME QUARTERLY. 1902. 3 yrs. for $1. W. H. Brock and Co., Athol, Mass.

HOW TO LIVE. 1918. m. Life Extension Institute, Inc., 25 W. 43d St., New York, N. Y.

HOW TO LIVE FOR HEALTH AND STRENGTH. 1925. m. $1.50. How to Live for Health and Strength, P. O. Box 455, Oklahoma City, Okla.

HYGEIA; THE HEALTH MAGAZINE. 1923. m. $3. Indexed: R.G. Q.C.Ind.Med. P.A.I.S. American Medical Association, 535 N. Dearborn St, Chicago, Ill. Bk.rev.

ILLINOIS HEALTH MESSENGER. 1929. s-m. Department of Public Health, Springfield, Ill.

INDIANA. DIVISION OF PUBLIC HEALTH. MONTHLY BULLETIN. 1897. 25c. (Free to interested persons.) Indiana Division of Public Health, Indianapolis, Ind.

IOWA PUBLIC HEALTH BULLETIN. q. Iowa State Department of Health, Des Moines, Ia.

JOURNAL OF HEALTH AND PHYSICAL EDUCATION. 1896. m. (Sept.-Je.) $2. Indexed: Educ.Ind. Q.C.Ind.Med. American Physical Education Association, 311 Maynard St., Ann Arbor, Mich.

JOURNAL OF THE OUTDOOR LIFE. 1904. m. $1. Indexed: Q.C.Ind.Med. National Tuberculosis Association, 50 W. 50th St., New York, N. Y.

KEY TO HEALTH. 1934. m. $2.50. Key to Health, 1 Willow St., East Aurora, N. Y.

LIBRARY INDEX; a weekly index to current periodical literature in the field of public health. 1921. w. $2.50. National Health Library of the National Health Council, 450 Seventh Ave., New York, N. Y. Bibl.

LIFE AND HEALTH. 1885. m. $1. Review and Herald Publishing Association, Takoma Park Station, Washington, D. C.

LIVE AND LEARN. 1917. m. Naturopathic Publishing Co., 488 Main Ct., Hartford Conn.

LIVE AND LET LIVE. 1930. 25c per no. Live and Let Live, 2-4 E. 23d St., New York, N. Y.

LOUISIANA BOARD OF HEALTH QUARTERLY BULLETIN. Louisiana Board of Health, New Orleans, La.

MARYLAND DEPARTMENT OF HEALTH MONTHLY BULLETIN. 1929. Maryland State Department of Health, Baltimore, Md.

MICHIGAN OUT-OF-DOORS. 1910. bi-m. 50c. Michigan Tuberculosis Association, Lansing, Mich.

MICHIGAN PUBLIC HEALTH. m. Michigan State Department of Health, Lansing, Mich.

MILBANK MEMORIAL FUND QUARTERLY BULLETIN. 1923. Milbank Memorial Fund, 40 Wall St., New York, N. Y.

MODERN HOSPITAL. 1913. m. $3. Indexed: Q.C.Ind.Med. Modern Hospital Publishing Co., Inc., 919 N. Michigan Ave., Chicago, Ill.

MODERN LIVING. 1930. m. $2. Modern Living Publishing Corp., 131 W. 30th St., New York, N. Y. Bk.rev.

MONTHLY HEALTH LETTER. 1910. m. $1.25. Hygienist Publishing Co., 1550 Lincoln St., Denver, Colo.

NATIONAL HEALTH REVIEW. q. Indexed: P.A.I.S. National Health Division, Department of Pensions and National Health, Ottawa, Ont.

NATURE'S PATH. 1896. m. $1. Benedict Lust Publications, 236 E. 35th St., New York, N. Y.

NEW YORK (CITY) DEPARTMENT OF HEALTH WEEKLY BULLETIN. Indexed: P.A.I.S. New York City, Department of Health, 139 Center St., New York, N. Y.

NEW YORK STATE DEPARTMENT OF HEALTH MONTHLY VITAL STATISTICS REVIEW. New York Department of Health, Albany, N. Y.

OHIO HEALTH NEWS. s-m. Ohio Department of Health, Columbus, Ohio.

OHIO PUBLIC HEALTH ASSOCIATION BULLETIN. 1921. Ohio Public Health Association, Columbus, Ohio.

PAN-AMERICAN UNION. SALUBRIDAD PUBLICA Y PREVISION SOCIAL. 1925. m. Pan-American Union, Washington, D. C. Bibl.

PENNSYLVANIA'S HEALTH. bi-w. Free. Indexed: P.A.I.S. Pennsylvania State Department of Health, Harrisburg, Pa.

PHILIPPINE ISLANDS, BUREAU OF HEALTH, MONTHLY BULLETIN. 1921. Free. Bureau of Health, Government of the Philippine Islands, Department of Public Instruction, Manila, P. I.

PHYSICAL EDUCATION, HEALTH, AND RECREATION DIGEST. 1934. m. $1. 29 Exeter St., Boston, Mass.

PUBLIC HEALTH NEWS. m. New Jersey State Department of Health, Trenton, N. J.

PUBLIC HEALTH NURSING. 1909. m. $3. Indexed: Int.Ind. P.A.I.S. Q.C.Ind. Med. National Organization for Public Health Nursing, Inc., 450 Seventh Ave., New York, N.Y., Bk. rev.

PUBLIC HEALTH REPORTS (U. S. Public Health Service). 1878. w. $2. Indexed: Eng.Ind. Ind.Arts. P.A.I.S. Q.C.Ind. Med. Superintendent of Documents, Washington, D. C.

PUERTO RICO JOURNAL OF PUBLIC HEALTH AND TROPICAL MEDICINE. 1926. q. Indexed: Q.C.Ind.Med. De-

partment of Public Health of Puerto Rico and the School of Tropical Medicine of the University of Puerto Rico, under the Auspices of Columbia University, New York, N. Y.

SUCCESSFUL LIVING. 1934. m. $3. National Scientific Publications, Inc., 325 W. 103rd St., New York, N. Y.

VITAL STATISTICS BULLETIN. m. Bureau of Vital Statistics, Pennsylvania Department of Health, Harrisburg, Pa.

WEEKLY HEALTH INDEX. U. S. Bureau of the Census, Division of Vital Statistics. 1930. Superintendent of Documents, Washington, D. C.

WEEKLY HEALTH MESSAGE. Iowa State Department of Health, Des Moines, Ia.

WEST VIRGINIA, STATE DEPARTMENT OF HEALTH, QUARTERLY BULLETIN. Indexed: P.A.I.S. West Virginia State Department of Health, Charleston, W. Va.

WISCONSIN. STATE BOARD OF HEALTH. BULLETIN. q. Wisconsin State Board of Health, Madison, Wis.

YOUR BODY. 1928. q. Your Body, New York, N. Y.

HEATING, VENTILATING, LIGHTING

AEROLOGIST. 1925. m. $2. Aerologist Publishing Co., 121 Clark St., Chicago, Ill.

AMERICAN ARTISAN — THE WARM AIR HEATING AND SHEET METAL JOURNAL. 1880. 13 times a year. $2. Engineering Publications, Inc., 1900 Prairie Ave., Chicago, Ill.

BIBLIOGRAPHY ON ILLUMINATION. Prepared by the Committee on Illumination of the Commercial-Technical Group. 1924. a. 25c. Special Libraries Association, 345 Hudson St., New York, N. Y.

HEATING AND VENTILATING. 1904. m. $2. Indexed: Eng.Ind. The Industrial Press, 148 Lafayette St., New York, N. Y.

SANITARY AGE. 1923. fort-n. $2. Age Publications, Ltd., 31 Willcocks St., Toronto, Ont.

HYGIENE (Industrial)

JOURNAL OF INDUSTRIAL HYGIENE. 1919. m. (Sept.-Je.) $6. Indexed: Eng.Ind. Ind.Arts. P.A.I.S. Q.C.Ind.Med. Harvard School of Public Health, 55 Van Dyke St., Boston, Mass. Abstr. Bk. rev.

HYGIENE (Mental)

HUMAN FACTOR. 1925. q. $1. Massachusetts Society for Mental Hygiene, Boston, Mass.

MENTAL HEALTH. 1923. Mental Hygiene Society of Maryland, Baltimore, Md.

MENTAL HEALTH. 1920. m. (10 mo.) Canadian National Committee for Mental Hygiene, 111 St. George St., Toronto, Ont.

MENTAL HEALTH. 1930. Mental Hygiene Institute, Montreal, Quebec.

MENTAL HEALTH BULLETIN. 1921. Danville State Hospital, Department of Community Service, Danville, Pa.

MENTAL HYGIENE 1917. q. $3. Indexed: Int.Ind. Q.C.Ind.Med. P.A.I.S. National Committee for Mental Hygiene, 450 Seventh Ave., New York, N. Y.

MENTAL HYGIENE BULLETIN. 1924. Southern California Society for Mental Hygiene, Los Angeles, Calif.

MENTAL HYGIENE NEWS. 1922. Connecticut Society for Mental Hygiene, New Haven, Conn.

NEW YORK, DEPARTMENT OF MENTAL HEALTH, MENTAL HEALTH HYGIENE LEAFLETS. 1930. irreg. New York Department of Mental Health, Albany, N. Y.

HYGIENE (Mother and Child)

BABY'S HEALTH. 1913. q. Merval Corporation, 425 Homestead St., Mount Vernon, N. Y.

CHILD AND FAMILY WELFARE 1924. q. $1. Canadian Council on Child and Family Welfare, 245 Cooper St., Ottawa, Ont.

CHILD DEVELOPMENT. 1930. q. $5. Williams and Wilkins Co., Mount Royal and Guilford Ave., Baltimore, Md.

CHILD DEVELOPMENT ABSTRACTS AND BIBLIOGRAPHY. 1927. bi-m. Committee on Child Development, National Research Council, B and 21st Sts., Washington, D. C.

CHILD HEALTH BULLETIN. 1925. bi-m. $2. (Free to members.) Indexed: Int.Ind. P.A.I.S. American Child Health Association, 50 W. Fiftieth

St., New York, N.Y. Bibl. Bk. rev.

CHILD WELFARE LEAGUE OF AMERICA. Bulletin. 1922. m. (Sept.-Je.) $1. Child Welfare League of America, Inc., 130 E. 22nd St., New York, N. Y.

EVERYBODY'S HEALTH. 1916. m. $1. Minnesota Public Health Association, 11 W. Summit Ave., St. Paul, Minn.

PAN-AMERICAN UNION. SALUBRIDAD PUBLICA Y PREVISION SOCIAL. 1925. m. Pan-American Union, Washington, D. C. Bibl.

QUARTERLY BULLETIN OF THE FRONTIER NURSING SERVICE. 1925. $1. Frontier Nursing Service, Lexington, Ky.

HYGIENE (Public)

AMERICAN ASSOCIATION FOR HYGIENE AND BATHS JOURNAL. 1918. a. $1. Indexed: Eng.Ind. American Association for Hygiene and Baths, 917 E. 47th St., Chicago, Ill.

AMERICAN JOURNAL OF HYGIENE. 1920. bi-m. $12. Indexed: Q.C.Ind.Med. School of Hygiene and Public Health, 615 N. Wolfe St., Baltimore, Md.

PAN-AMERICAN SANITARY BUREAU. BOLETIN DE LA OFICIANA SANITARIA PANAMERICANA. (Text in French, Portuguese, and Spanish.) 1922. m. Pan-American Sanitary Bureau, Washington, D. C. Abstr.

PRACTICAL HOME ECONOMICS. 1932. m. $2. Indexed: Educ.Ind. P.A.I.S. Lakeside Publishing Co., 468 Fourth Ave., New York, N. Y.

MOTORCYCLING, BICYCLING

AMERICAN MOTORCYCLIST AND BICYCLIST. 1906. m. $2. Cycling Press, Inc., 461 Eighth Ave., New York, N. Y.

MOTORCYCLIST. 1912. m. $1. American Motorcycle Association, 706 Union League Bldg., Los Angeles, Calif.

MOUNTAINEERING

APPALACHIA. 1876. s-a. $1.50. Indexed: Mag.Sub.Ind. Appalachian Mountain Club, 5 Joy St., Boston, Mass.

APPALACHIAN MOUNTAIN CLUB. BULLETIN. 1907. m. $2. Appalachian Mountain Club, 5 Joy St., Boston, Mass.

CALIFORNIA OUT-OF-DOORS. 1921. 3 times a year. Membership. Tamalpais Conservation Club., 521 Philan Bldg., San Francisco, Calif.

CANADIAN ALPINE JOURNAL. 1907. a. Indexed: Mag.Sub.Ind. Alpine Club of Canada, Banff, British Columbia.

HARVARD MOUNTAINEERING. 1927. Harvard Mountaineering Club, Cambridge, Mass.

MAZAMA. 1896. m. $2. Indexed: Mag. Sub.Ind. Mazama, 306 Yamhill St., Portland, Ore.

MOUNTAIN MAGAZINE. 1921. q. $1. Associated Outdoor Clubs of America, Great Oak Lane, Pleasantville, N. Y.

MOUNTAINEER. 1907. m. $2. Indexed: Mag.Sub.Ind. Mountaineer, Inc., P. O. Box 122, Seattle, Wash.

PRAIRIE CLUB. BULLETIN. m. (Sept.-Je.) $1.25. Prairie Club, 38 S. Dearborn St., Chicago, Ill.

SIERRA CLUB BULLETIN. 1893. bi-m. $1. Indexed: Mag.Sub.Ind. Sierra Club, 220 Montgomery St., San Francisco, Calif.

TRAIL AND TIMBERLINE. 1918. m. $1.50. Colorado Mountain Club, 422 Chamber of Commerce Bldg., Denver, Colo.

PHYSICAL CULTURE

ARENA AND STRENGTH. 1929. m. $1.50. Milo Publishing Co., 2741 N. Palethrop St., Philadelphia, Pa.

HEALTH AND LIFE. 1922. m. $2. Health and Life Publications, 504 S. Dearborn St., Chicago, Ill.

PHYSICAL CULTURE. 1898. m. $1.50. Physical Culture Publishing Corporation, 1926 Broadway, New York, N. Y.

WONDER CURES. 1931. Physical Culture Hotel, Dansville, N. Y.

PHYSICAL EDUCATION

CALIFORNIA PHYSICAL EDUCATION, HEALTH AND RECREATION JOURNAL. 1932. q. 75c for non-members. California Association of Health, Physical Education, and Recreation, 1110 South Fedora St., Los Angeles, Calif.

JOURNAL OF HEALTH AND PHYSICAL EDUCATION. 1896. m. (Sept.-Je.) $2. Indexed: Educ.Ind. Q.C.Ind.Med. American Physical Education Association, 311 Maynard St., Ann Arbor, Mich. Bk.rev.

JOURNAL OF PHYSICAL EDUCATION. 1901. bi-m. (Sept.-Je.) $1. Free to members. Physical Directors' Society, Young Men's Christian Association of North America, 347 Madison Ave., New York, N. Y. Bk.rev.

MIND AND BODY. 1894. m. (Sept.-Je.) $2. Indexed: Educ.Ind. Mind and Body Publishing Co., New Ulm, Minn. Abstr.

PHYSICAL EDUCATION, HEALTH, AND RECREATION DIGEST. 1934. m. $1. 29 Exeter St., Boston, Mass.

RESEARCH QUARTERLY (American Physical Education Association). 1930. q. $3. Indexed: Educ.Ind. American Physical Education Association, 311 Maynard St., Ann Arbor, Mich. Bibl. Bk.rev.

SCHOLASTIC COACH. 1931. m. (Sept.-May.) Scholastic Coach Corporation, 155 E. 44th St., New York, N. Y.

PHYSICAL THERAPY

ARCHIVES OF PHYSICAL THERAPY, X-RAY, AND RADIUM. 1919. m. $5. Indexed: Q.C.Ind.Med. Slavick Printing Co., 30 N. Michigan Ave., Chicago, Ill. Abstr.

PHYSIOTHERAPY REVIEW. bi-m. $2.50 to non-members. American Physiotherapy Association, 719 Barry Ave., Chicago, Ill. Abst.

PHYSIOLOGY

AMERICAN JOURNAL OF PHYSIOLOGY. 1898. m. $7.50. Indexed: Q.C.Ind. Med. American Physiological Society, 19 W. Chase St., Baltimore, Md.

JOURNAL OF EXPERIMENTAL ZOOLOGY. 1890. 8 times a year. $7.50. Indexed: Q.C.Ind.Med. Wistar Institute of Anatomy and Biology, 36th St. and Woodland Ave., Philadelphia, Pa.

JOURNAL OF GENERAL PHYSIOLOGY. 1918. bi-m. $5. Indexed: Q.C.Ind. Med. Rockefeller Institute for Medical Research, York Ave. and Sixty-sixth St., New York, N. Y.

PHYSIOLOGICAL REVIEWS, 1921. q. $6. Indexed: Q.C.Ind.Med. American Physiological Society, 19 W. Chase St., Baltimore, Md.

PHYSIOLOGICAL ZOOLOGY. 1928. q. $7.50. University of Chicago Press, 5750 Ellis Ave., Chicago, Ill.

PLAY, PAGEANTS

Playgrounds, Recreation, Leisure

AMUSEMENT PARK MANAGEMENT. 1928. m. $4. Sylvan Hoffman, 404 Fourth Ave., New York, N.Y.

AMERICAN RESORTS. 1927. m. $2. Patterson Publishing Co., 5 S. Wabash Ave., Chicago, Ill.

BEACH LIFE. 1928. m. $1. Beach Life, 307 Florida Theater Bldg., Jacksonville, Fla.

CALIFORNIA PHYSICAL EDUCATION, HEALTH AND RECREATION JOURNAL. 1932. q. 75c for non-members. California Association of Health, Physical Education, and Recreation, 1110 South Fedora St., Los Angeles, Calif.

LEISURE; THE MAGAZINE OF A THOUSAND DIVERSIONS. 1933. m. $1. Frederick E. Atwood, 683 Atlantic Ave., Boston, Mass.

MINIATURE SPORTS NEWS. 1930. m. Community Recreational Publishing Co., 540 Michigan Blvd., Chicago, Ill.

PARKS AND RECREATION. 1917. m. $3. Indexed: P.A.I.S. American Institute of Park Executives, 651 Sexton Bldg., Minneapolis, Minn. Abstr. Bk.rev. Tech.

PHYSICAL EDUCATION, HEALTH, AND RECREATION DIGEST. 1934. m. $1. 29 Exeter St., Boston, Mass.

RECREATION. 1906. m. $2. Indexed: R.G. P.A.I.S. National Recreation Association, 315 Fourth Ave., New York, N. Y.

STATE RECREATION. q. $1. National Conference of State Parks, Washington, D. C.

SCOUTING

BOY'S LIFE. 1912. m. $1. National Council of Boy Scouts of America, 2 Park Ave., New York, N. Y.

HANDBOOK FOR BOYS. 1910. 2 or 3 times a year. 50c. National Council of Boy Scouts of America, 2 Park Ave., New York, N. Y.

QUAKER CITY SCOUT. 1922. m. $1. (Free to members in Philadelphia.) Philadelphia Council of Boy Scouts of America, Twenty-second and Winter Sts., Philadelphia, Pa.

SCOUT EXECUTIVE. 1920. m. (Not issued in August.) 50c. National Council of

Boy Scouts of America, 2 Park Ave., New York, N. Y.

SCOUTING. 1913. m. $1. National Council of Boy Scouts of America, 2 Park Ave., New York, N. Y.

TRAP SHOOTING

SPORTSMAN'S REVIEW; A WEEKLY DIGEST OF TRAP SHOOTING. 1890. w. $4. Sportsman's Review Publishing Co., Inc., 22 E. 12th St., Cincinnati, Ohio.

U. S. R. A. BULLETIN. 1912. bi-m. 50c. United States Revolver Association, Myrick Bldg., Springfield, Mass.

WOMEN'S SPORTS AND ATHLETICS

SPORTSWOMAN. 1924. m. (Sept.-Je.) $3. Sportswoman Guild, Inc., 430 West 116th St., New York, N.Y.

WOMAN ATHLETIC. 1922. m. $3. Illinois Women's Athletic Club, 115 E. Pearson St., Chicago, Ill. Bk.rev.

MISCELLANEOUS

AMERICAN JOURNAL OF PHYSICAL ANTHROPOLOGY. 1918. q. $6. Indexed: Int.Ind. Q.C.Ind.Med. Wistar Institute of Anatomy and Biology, 36th St. and Woodland Ave., Philadelphia, Pa. Abstr. Bibl. Bk.rev. *Physical anthropology.*

AMERICAN JOURNAL OF PSYCHOLOGY. 1887. q. $6.50. Indexed: Int.Ind. American Journal of Psychology, Morrill Hall, Cornell University, Ithaca, N. Y. Bk.rev. *Psychology.*

AMERICAN MEDICAL ASSOCIATION JOURNAL. 1883. w. $7. Indexed: Q.C.Ind. Med. American Medical Association, 535 N. Dearborn St., Chicago, Ill. *General medicine.*

BIOLOGICAL ABSTRACTS. 1925. m. (Sept.-Je.) $15. Union of American Biological Societies, University of Pennsylvania, Thirty-eighth St. and Woodland Ave., Philadelphia, Pa. *Biology, zoology, botany.*

CHILD STUDY; A JOURNAL OF PARENT EDUCATION. 1923. m. (Oct.-Je.) $1. Indexed: Educ.Ind. Child Study Association of America, Inc., 221 W. 57th St., New York, N. Y. *Child training, parent education.*

ENDOCRINOLOGY. 1917. bi-m. $6. Indexed: Q.C.Ind.Med. Association for the Study of Internal Secretions, Suite 1214, 1930 Wilshire Blvd., Los Angeles, Calif. Abstr. Bk.rev. *Medical.*

HUMAN BIOLOGY. 1927. q. $5. Indexed: Q.C.Ind.Med. Johns Hopkins Press, Homewood, Baltimore, Md. *Human biology.*

INDUSTRIAL MEDICINE. 1932. m. $5. Indexed: Q.C.Ind.Med. Industrial Medicine, 844 Rush St., Chicago, Ill. *Industrial medicine.*

JOURNAL OF LABORATORY AND CLINICAL MEDICINE. 1915. m. $8.50. Indexed: Q.C.Ind.Med. C. V. Mosby Co., 3525 Pine St., St. Louis, Mo. Abstr. Bk.rev. *Medical.*

MUNICIPAL SANITATION. 1920. m. $2. Indexed: P.A.I.S. Case-Shepperd-Mann Publishing Corporation, 24 W. 40th St., New York, N.Y. *Sanitation.*

NATIONAL SAFETY NEWS. 1919. m. $4. Indexed: Ind.Arts. P.A.I.S. National Safety Council, Inc., 20 N. Wacker Drive, Chicago, Ill. *Industrial, accident, fire protection, and health.*

PSYCHOLOGICAL ABSTRACTS. 1927. m. $6. American Psychological Association, Princeton, N. J. Abstr. *Psychology.*

PSYCHOLOGICAL CLINIC. 1907. q. $3. Indexed: Int.Ind. Q.C.Ind.Med. Psychological Clinic Press, Woodland Ave. and 36th St., Philadelphia, Pa. Bk. rev. *Psychology, hygiene.*

PSYCHOLOGICAL REVIEW. 1894. bi-m. $5.50. Indexed: Int.Ind. Psychological Review Company, Princeton, N. J. *Psychology.*

Guide to Sports and Outdoor Recreations

A Selected List of Books 1918 to December 31, 1934

Compiled by WILSON M. RANCK
New York City

INTRODUCTION

WHEN the idea for a "Guide to Sports and Outdoor Recreations" first came to me, late in 1933, my thoughts were mainly to produce a work for the use of librarians. It had been my observation that the libraries I was familiar with had extremely poor collections in this field and furthermore that the librarian's knowledge of what they did have was entirely inadequate. A brief study of the situation convinced me that while there were several rather large bibliographies of literature on sports and recreations there were none of any length from the library viewpoint. The majority were not annotated; mere lists of books and pamphlets, some with periodical articles mixed in. My first idea, then, was to produce a list of some length, covering as many of the sports and recreations as possible, and have it adequately annotated for use in libraries.

As work on the list progressed and I came in contact with physical education leaders in various communities, I realized there was also a demand from this quarter for such a list. All with whom I talked expressed emphatically that they could use such a list. One person, head of the department at a mid-western university, said that almost daily she received letters asking for suggested reading in all branches of sport. These came from high school directors and from individuals not connected with schools. She lamented the fact that there was no list available which was comprehensive yet selective and compiled from the point of view of a reader's advisor. In the past it was the director's needs that were thought of, not the athlete or sportsman.

With these factors in mind, that of producing a selected list with the individual and the library uppermost, work moved forward. Books which treat the subject from the point of view of the competitor and spectator, rather than for the coach or teacher, were desirable; this because it is these persons and not the coach who come for advice. The coach, camp director, or physical education teacher is familiar with literature having his viewpoint and knows what he wants and how to get it. Libraries should have books for them but the problem is different.

Surveying the field it is at once evident that there are thousands of sports books in print. Limitations were necessary to make the list prac-

tical. American books, almost entirely, are the only ones considered. The exceptions are for those sports which are highly English and as a result have little from the American press. Dates of publication had to be considered. Considering the great change in emphasis on sports and recreations which has resulted since the War, 1918 was taken as the starting point. Certain well known and standard books of an earlier date are included, and in one or two instances those of an historical nature are noted, but on the whole the list is confined to the period between 1918 and December 31, 1934. Periodical literature was not considered at all; the only mention being in an appendix where a list of special magazines on sports and recreations is given.

Having set these limits, it was necessary to decide what subjects to include and what to exclude. Only those sports and recreations are included in which physical skill is required. The possible exception might be billiards and pool, but coordination of muscles are so important in these games that I feel they qualify. Sports and recreations of more or less wide following were preferred, especially if they had book literature. Anything in the way of sports which was motorized was eliminated. This accounts for the omission of motor camping, motor boating, touring, and automobile racing. Horse racing is omitted because it is the condition of the horse, rather than rider, which is the important item. Some less widely known games and recreations are omitted because of lack of book material. Social games such as dancing, play games, and the like are not included. No card games or games of purely mental skill were examined. With all these limitations set forth, there were still more than fifty well-known sports and recreations. With the time at hand it seemed possible to cover this ground fairly adequately.

During the course of time while working on this project more than twelve hundred books were examined. Annotations and reviews of many more were consulted. While this seems like a fairly large number of books, it must be remembered that since 1918 nearly three thousand books on sports, games, and amusements have been published in this country alone; England has produced nearly as many. Roughly, about half of the books under the heads mentioned do not come within the limitations set up. From the books examined the present list of more than five hundred titles has been selected. The basis of selection has been set forth already—books for the individual competitor and spectator and not the teacher. Preference was given, in all cases, to books stressing sportsmanship, character, and clean living. Libraries as well as physical education leaders have a responsibility in this direction.

When it came to the arrangement of the material it seemed obviously best to divide it into two parts; competitive and non-competitive, i.e., sports (as games) and outdoor recreations (for the joy of doing, not of winning). In each section related sports have been grouped together as much as possible. Subdivisions under a sport or recreation may not be

the best, but they attempt to show how the literature falls into more or less definite topics for discussion. There is much overlapping no matter how the divisions may be made. Something of the popularity and extent of the sport as well as the amount of literature concerning it is mentioned. The introductory comment under each main head attempts to indicate these features.

The annotations are quite definitely for the librarian. However, they will be useful for any one wishing to get in brief form the contents of the books. Special care has been made to bring out features of the book. Author's reputation and position, illustrations, scope of the book, value as compared with others, readability, indexes, appendices, bibliographies, subjects covered and how treated, and editions are points which are noted. Prices indicated are the publication prices and should be checked. Free use has been made of reviews and annotations of others; in all cases such use is indicative of approval on the part of the compiler. As before noted, sportsmanship is emphasized throughout; the annotations further bring out these points. The above features which are included in the comment on each book are items which librarians must consider in choosing for purchase. They are also important for anyone doing advisory work in suggesting reading, such as is done by physical education teachers, recreation directors, and camp heads.

The compiler is greatly indebted to the following libraries for permission to use their materials while working on this list: Grand Rapids Public Library; University of Michigan General Library; Kellogg Public Library, Green Bay, Wisconsin; Manitowoc Public Library, Manitowoc, Wisconsin; Milwaukee Public Library; Joseph Mann Library, Two Rivers, Wisconsin; Madison Public Library, Madison, Wisconsin; Library of the Wisconsin Library School; General Library of the University of Wisconsin; Physical Education Library for Women, University of Wisconsin; and the Library of Columbia University. Miss Mary E. Hazeltine, Principal of the Wisconsin Library School, under whose direction this work began, should receive a great deal of credit for the results obtained. Her patience and advice were deeply appreciated. To my father for his unswerving belief in my project as well as his opinions and guidance I owe much. Many others have given assistance which was of value. They deserve thanks.

The following printed sources have been consulted, in addition to those noted in Appendix V: *United States Catalog* series, 1918–January 1935; *American Library Association Catalogs*, 1912–1921, 1926, 1926–1931; the following in the Standard Catalog series: *High School Libraries*, 2d ed. 1932; *Children's Catalog*, 4th ed. 1930, and supplements to 1933; *Fine Arts Section*, 1928 and all supplements; *A.L.A. Booklist*, 1918–December 1934; *Wisconsin Library Bulletin*, 1918–December 1934; *Bulletin of Bibliography*, 1918–April 1934; *Book Review Digest*, 1918–January 1935; *Publishers' Weekly*, 1918–January 1935; *New York Times Book Review*, 1934; *Carnegie Public Library* (Pittsburgh)

Monthly Bulletin, 1918–1928 and its successor *Among Our Books*, 1929 (Jan., Feb., Mar.), 1932; publishers' announcements; and miscellaneous reviews.

The material in the appendices has been gathered from the sources indicated and is included in the belief it will be of use to librarians in obtaining more and better material. The list of organizations will suggest places to write for good but inexpensive literature in pamphlet form while the list of periodicals may be helpful as well. The other lists do not seem to need explanation other than what is said in introducing them in the text.

And now, as a librarian, it is my hope that this list will partially awaken libraries and librarians to the fact that sports and recreations deserve a more prominent place in libraries. Good sports books are, to my mind, much better reading and more worth-while than cheap periodicals and light fiction. Good sports books encourage participation in clean health-producing physical activities; and, as a way to use leisure time, sports, properly participated in, cannot be surpassed. Character developed through sports and recreations is carried on into life and makes for a better world. The sooner libraries realize this fact the better. Physical education leaders can greatly assist in bringing this about by recommending worth-while reading to the young men and young women athletes of this country. If this list will help physical directors, recreation leaders, camp directors, librarians, athletes, and sportsmen to better reading and appreciation of these activities of health and character building nature, the writer will share satisfaction in this contribution apart from the personal satisfaction he gained from the compiling of the work.

CONTENTS

PAGE

INTRODUCTION 75
CONTENTS 78

PART I

GENERAL BOOKS 80
BASEBALL 86
Indoor Baseball and Playgroundball 87
FOOTBALL 88
General and Biographical 88
Coach and Player 89
Special Phases 90
Training and Conditioning 91
For the Spectator 91
BASKETBALL 92
For Men 92
For Women 93
TRACK AND FIELD ATHLETICS 93
OLYMPIC GAMES 94
GOLF 96
Improve Your Game 96

PAGE

For Women ... 97
About Golfers ... 98
For the Dub ... 98
Care and Construction of the Course ... 99
COURT GAMES ... 99
Lawn Tennis ... 99
General and Historical ... 99
Playing the Game ... 100
By and for Women ... 101
Racquets, Squash and Court Tennis ... 102
Badminton ... 102
FIELD GAMES ... 103
Cricket ... 103
Lacrosse ... 104
Polo ... 104
Field Hockey ... 105
Soccer ... 106
Speedball ... 106
SWIMMING AND DIVING ... 107
ROWING ... 108
ICE SPORTS ... 109
Curling ... 109
Ice Hockey ... 110
SELF-DEFENSE ... 110
Boxing ... 111
Historical ... 111
Biographical ... 111
How to Box ... 112
Bull Fighting ... 112
Fencing ... 113
Jiu-Jitsu ... 114
Wrestling ... 114
MINOR SPORTS ... 115
Billiards and Pool ... 115
Bowling ... 115
Croquet ... 116
Gymnastics ... 116
Handball ... 117
Horseshoe Pitching ... 117
Shuffleboard ... 117
Lawn Bowls ... 117
Table Tennis ... 118
Volleyball ... 119

PART II

HUNTING AND FISHING ... 119
Conservation ... 120
Hunting ... 121
General ... 121
Game Birds, Fowl, and Small Game ... 122
Fox Hunting ... 122
Hunting Dogs ... 122
Big Game—North America ... 123
Big Game—Foreign ... 123

PAGE

Fishing 125
General 125
Equipment 126
With Bait and Fly 126
Bass Fishing 127
Trout Fishing 127
Salmon Fishing 128
Whaling and Sealing 128
Miscellaneous 128
SHOOTING 129
TRAPPING 130
ARCHERY 131
OUTDOOR LIFE 132
CAMPING 133
Organized Camps 133
Unorganized Camping 134
CANOEING 135
SAILING 136
BOAT BUILDING 137
HIKING 138
MOUNTAINEERING 138
Mount Everest 139
HORSEMANSHIP 140
WINTER SPORTS 141
Skiing 142

APPENDICES

I. Organizations Publishing Material on Sports and Recreations 143
II. Periodicals Dealing with Sports and Recreations 144
III. Suggested List for Small Libraries 146
IV. Suggestions for the Boys' and Girls' Department 148
V. Bibliographies Consulted 149

PART I

GUIDE TO SPORTS

GENERAL BOOKS

There are a great many books in print which deal with several different sports; these are under this head, with analytics indicated if entered in part under a special event. A few general books on sportsmanship, coaching, and the place of games in American life are also included under this head. For more up-to-date information as to sports and games than is to be found in books, the daily newspapers are excellent. The local papers cover items of local interest and some of the bigger events, but for current news concerning championship competitions in all sports here and abroad, the *New York Times* is as good as any. A convenient record book, obtainable in every library, is the *World Almanac* which has a section devoted to past winners and includes records in many sports. For biographical information on American sportsmen, still living, *Who's Who in American Sports*, published in 1928, is the best. Unfortunately

even this aid has many bad omissions, including such well known athletes and coaches as Yost, "Red" Grange, and Lou Gehrig. There is no adequate sports encyclopedia at the present time. The *Encyclopaedia of Sports and Games*, published in 1911 in a revised and enlarged edition, is the best and most recent. It is largely English, places great emphasis on hunting and fishing, and is very much out of date. In many respects the 14th edition of the *Encyclopaedia Britannica*, with its excellent index, is more useful than the special one noted above. Use of the periodical indexes for up-to-the-minute articles should supplement book material. Many of the general magazines have regular sports sections as well as feature articles concerning sports. In addition there are more than one hundred special sport magazines, many of which are noted in an appendix to this list. In pamphlet form there is much; this list includes almost none. A group of organizations which publish considerable material in this field are named in an appendix with their addresses. Literature may be secured from them on application.

BANCROFT, J. H., and PULVERMACHER, W. D. *Handbook of Athletic Games.* New York: Macmillan Co., 1916.

Analytics for: field hockey, handball, ice hockey, indoor baseball, lacrosse, polo, soccer, squash, volleyball, and rowing.

The authors, in condensed form, cover fifteen of the leading sports and make them more understandable to player, coach, and spectator. It is an attempt to show the scope of sports in America in a practical manner. Includes the major sports in addition to those noted above. Now somewhat out of date, but it is recognized as a contribution of merit. Index, diagrams, bibliographies.

BARBOUR, R. H. *Book of School and College Sports.* New York: D. Appleton & Co., 1904. 0. p.

Analytics for: lacrosse, ice hockey.

Football, baseball, track and field athletics, lacrosse, ice hockey, and lawn tennis are covered historically from the college standpoint. How to play, rules, and records are included. The 1903 All-America football team is listed. The rules are now greatly out of date but the records are of interest. The author is a very popular boys' writer.

BERRY, ELMER. *Philosophy of Athletics.* New York: A. S. Barnes & Co., 1927. $2.00.

Athletics as a means of education. Sportsmanship is as essential in life as in athletics; the coach should stress these principles throughout. Primarily for coaches.

BICKLEY, GRAHAM. *Handbook of Athletics for Coaches and Players.* New York: A. S. Barnes & Co., 1929. $1.80.

Good for the player as well as the coach. Considers equipment, different positions and how to play them for the four leading intercollegiate sports: football, track, basketball, and baseball.

CAMP, W. C. *Athletes All* (School, College and Service Athletics). New York: Chas. Scribner's Sons, 1919. $1.75.

A good, general book on the qualities needed in an athlete as well as how to be one. Another book in the same series is his *Training for Sports* (1921, Scribner, $2) which stresses the need of physical preparation for any strenuous sport.

CAMP, W. C. ed. *Book of Sports and Games.* Rev. and enl. ed. New York: T. Y. Crowell Co., 1923. $2.00.

First edition published in 1903. There is also a 1930 reprint which includes a chapter on lacrosse.

Analytics for: rowing, canoeing, bowling, cricket, croquet, ice hockey, field hockey, lawn bowls, polo, quoits, and soccer.

A very readable book on more than a dozen well-known sports. Describes the game, its history, and gives helpful hints. True to Camp's ideals, stress is placed upon sportsmanship. Includes baseball, basketball, camping, tennis, football, and golf in addition to the lesser known sports noted above.

CAMPBELL, W. G., and REED, R. K. *Coaching High School Athletics.* Los Angeles: C. C. Crawford, 1932. $2.00.

Introduction by Howard Jones.

A book which the young man considering high school coaching as a profession might well read before making a decision. The authors are experienced and treat the subject from all sides. The necessity of good sportsmanship and good spirit on the part of player, coach, and spectator is emphasized.

CAULKINS, E. D. ed. *Intimate Talks by Great Coaches.* New York: Wingate Memorial Fund, 1930. $2.00.

Analytics for: soccer, hockey, and lacrosse.

Lectures by well-known coaches on various aspects of several sports. Among those covered are football, basketball, swimming, track and field, baseball, and tennis. They are directed to player and coach and each brings out a particular point.

CHARNLEY, M. V. ed. *Play the Game.* New York: Viking Press, 1931. $3.50.

Foreword by Fielding H. Yost, Director of Athletics, University of Michigan.

A series of articles, many of them reprinted from the *American Boy*, by leading sport figures of the day. Boys will find them good reading and inspiring to clean sports.

FEDDERSEN, M. H. *Deck Sports.* Boston: Hale, Cushman & Flint, Inc., 1933. $1.00.

Analytics for: shuffleboard, badminton, and table tennis.

Covers a field seldom written about and one which is becoming more and more popular. Many minor events are included and many adaptations are made for use on board ship. Outlines a complete recreational program for a passage.

GARDINER, E. N. *Athletics of the Ancient World.* New York: Oxford Univ. Press, 1930. $12.00.

Based on his *Greek Athletic Sports and Festivals.* o. p.

"In scope this book is wider and in treatment simpler and briefer than the earlier work; and, as most detail of merely archeological value has been omitted, it should appeal to a larger public . . . Dr. Gardiner writes concisely and convincingly. His book should command the attention not only of classical scholars but of all who are interested in athletics for their own sake; and for such readers he has spared no pains to make his work intelligible." *Times (London) Literary Supplement.*

GRAYSON, CHARLES. ed. *The Sportsman's Hornbook.* New York: Random House, 1933. $7.50.

A group of poems relating to all phases of sport and taken from all periods of time. The arrangement is more or less by subject. An index of authors, poems, and first lines would be useful. Ernest Smythe is responsible for the decorations. About 115 poems are reprinted in the more than 160 pages of the volume.

GRIFFITH, C. R. *Psychology of Coaching.* New York: Chas. Scribner's Sons, 1926. $2.00.

A well-known psychologist analyzes coaching methods from a new angle. He believes that every coach should study each of his athletes just as a psychologist would study them and their reactions.

HAMMETT, C. E., and LUNDGREN, C. L. *How to Be an Athlete.* Boston: D. C. Heath & Co., 1923. $4.00.

Introduction by J. L. Griffith.

A good practical book on field and track athletics, football, baseball, basketball, and tennis. A similar book is Hammett's *Major Sport Fundamentals* (1927, Scribner $2) which covers the same sports with the exception of tennis.

HEDGES, S. C. *Games for Small Lawns.* Philadelphia: J. B. Lippincott & Co., 1933. $1.25.

"Describes equipment and play of a variety of games suitable for a small lawn. Includes net games such as badminton, volleyball, etc., also croquet, clock golf, horseshoe ringing, skittles, various ball games involving wrestling, running, jumping, etc. One chapter gives a number of lawn party programs." *Book Review Digest.* The book fills a real need.

JOHNSTON, C. H. L. *Famous American Athletes of Today.* 4th ser. Boston: L. C. Page & Co., 1934. $2.50.

First series, 1928; second series, 1930; third series, 1932. The material contained is not the same in any two series. The articles are brief biographical sketches of the foremost individuals in all fields of sport. Illustrated with photographic portraits.

KENDALL, W. G. *Four Score Years of Sport.* Boston: Stratford Co., 1934. $2.00.

The highlights of the life of Boston's most beloved sportsman. Dr. Kendall's interests in sport were as varied as the number of sports themselves. The book "is not only entertaining to read, but has definite value as source material for the historian of the American social scene from the mid-nineteenth century onward." *Hartford (Connecticut) Courant.*

KENNEDY, C. W. *Sport and Sportsmanship.* Princeton, New Jersey: Princeton Univ. Press, 1931. $1.25.

Three essays on sportsmanship by the chairman of the Princeton Board in Control of Athletics. He is also Vice-President of the American Olympic Committee and President of the National Collegiate Athletic Association (1930). These appeared in part in the periodicals *Recreation* and *Sportsmanship.*

KING, MARIAN. *The Story of Athletics* (City and country series). New York: Harper & Bros., 1931. $1.25.

"Following an account of the games and sports of ancient Greece and Rome, the book traces the history and present standing of archery, fencing, boxing, wrestling, horseback-riding, and the various track and field games. Bibliography and index." *Book Review Digest.*

KROUT, J. A. *Annals of American Sport* (Pageant of America, v. 15). New Haven: Yale Univ. Press, 1929. Subs. only.

Historical development of sports in American life. Has a section devoted to outdoor life. Chief value is in its photographic reproductions, portraits, and biographical material rather than in its text. Bibliographies. Index in two parts: biographical and general.

LAWSON, A. H. *Homemade Games.* Philadelphia: J. B. Lippincott & Co., 1934. $2.00.

". . . how to make and play indoor and outdoor games; with a foreword by Angelo Patri." *Title page.*

Covers, among others, shuffleboard, tennis games, badminton, tenpins and quoits. Material presented has a wide range of appeal. Illustrated.

Lonsdale Library of Sports, Games and Pastimes. Philadelphia: J. B. Lippincott & Co.

Edited by the Earl of Lonsdale and Eric Parker.

Replaces the *Badminton Library* to a great extent. The following titles are included in the present list, fully discussed on the page noted: Aberdare of Duffryn, *Rackets, Squash Rackets, Tennis, Fives, and Badminton* (102); Brooke, *The Way of a Man with a Horse* (141); Chapman, *Game of Cricket* (103); Cooper, *Sea Fishing* (128); Frederick, *Fox Hunting* (122); Irving and Martin, *Cruising and Ocean Racing* (136); Knebworth, *Boxing* (112); Lytton, *Winter Sports* (142); Maydon, *Big Game Shooting in Africa* (124); Myers, *Lawn Tennis* (101); Parker, *Anthology of Sporting Prose and Verse* (120); Parker, *Fine Angling for Coarse Fish* (125); Parker, *Shooting by Moor, Field, and Shore* (121); Smith, *Hounds and Dogs* (123); Taverner, *Salmon Fishing* (128); Taverner, *Trout Fishing* (128); Wethered, *The Game of Golf* (97).

MEANWELL, W. E., and ROCKNE, K. K. *Training, Conditioning, and the Care of Injuries.* Madison, Wis.: H. D. Gath, 1931. $2.00.

The methods of these two well-known coaches, one famed at Notre Dame, the other for his basketball teams at Wisconsin, are worth considering and following.

MITCHELL, E. D. *Intramural Athletics.* New York: A. S. Barnes & Co., 1925. $2.00.

Mr. Mitchell is Director of Intramural Athletics at the University of Michigan and one of the recognized leaders in this field. While this is a book which is intended for the athletic director of a college, and especially for intramural heads, it is a publication which will be useful in high schools as well. The development of this phase of athletics has been noteworthy since the war. Now nearly out of print.

MULLEN, S. MCL., and LANZ, M. S. ed. *Playing the Game.* New York: Century Co., 1928. $1.50.

A series of short stories on sportsmanship. While particularly good for teachers and counsellors of youth, they are good reading for young and old. Stories on baseball, hockey, hunting, tennis, track, football, swimming, sailing, basketball, horseback riding, and skiing are included.

POST, J. H., and SHIRLEY, M. J. *Selected Recreational Sports for Girls and Women.* New York: A. S. Barnes & Co., 1933. $2.00.

Analytics for: horseshoe pitching, shuffleboard, table tennis.

An excellent book treating of the history of each sport briefly, something of the play of the game, and with an appendix giving good diagrams. Will interest girls and women, especially teachers and those in charge of group work. Includes deck tennis, clock golf, paddle tennis, and others. Bibliographies. An appendix gives useful equipment information for each game.

RICE, GRANTLAND, and POWEL, H. W. H. ed. *The Omnibus of Sport.* New York: Harper & Bros., 1932. $3.50.

"A collection by subject of newspaper stories, parts of novels, and poems covering all the sports of interest today, and a section devoted to classic accounts of the sports of antiquity." *Pittsburgh.*

SAVAGE, H. J., and others. *American College Athletics* (Carnegie Foundation for the Advancement of Teaching. Bulletin No. 23). New York: Pub. by the Foundation, 1929. Gratis.

The most widely talked of bulletin on college sports which has been published. A very thorough and extensive report on conditions in American colleges, in the main condemning them for overemphasis and professionalism. Individual schools are named throughout, their policies exposed, and frequently quoting from reports. Created a storm of argument among athletic directors, educators, and the public at large. Another book on college athletics, written several years earlier, is Kennedy's *College Athletics* (1925, Doran, $1.50) which treats the subject in an entirely different manner. This is a "general discussion of the place of sport in the college program, the administrative control and the business management of college athletics, and the right emphasis on college sport." *Pittsburgh.*

Spalding's Athletic Library. New York: American Sports Pub. Co.

Pamphlets and rulebooks on almost all of the sports. There are several series with prices ranging from ten cents to fifty cents. May be secured from any Spalding sporting goods store. There are other similar series but none of them are so extensive or so well gotten out.

STOW, EDITH. *Boys' Games Among the North American Indians.* New York: E. P. Dutton & Co., 1924. $1.50.

"Descriptions of about thirty games played by Indian boys in their native villages. Many of these games, such as football, shinny, and quoits, are similar to the sports of today. Good diagrams and pictures." *Pittsburgh.* Adds something to the background of American sports.

TUNIS, J. R. *$port$.* New York: John Day Co., Inc., 1928. $2.50.

Mr. Tunis is (1928) tennis writer for the *New York Evening Post.*

It is "an admirable picture of what the printing press has done to sportsmanship in America." *Stuart Chase.*

WARNER, G. S. *"Pop" Warner's Book for Boys.* New York: Robert M. McBride & Co., 1934. $2.00.

Assisted by Frank J. Taylor, Warner has written a book which is a real contribution to the boy's collection. He talks simply to boys, tells them what is best and what to avoid; he makes himself an older brother to his readers. Baseball, track and field, basketball, and football are discussed. Diagrams by Richard Stevens are excellent. The introduction should be read by all; sportsmanship and team play are stressed.

WEBSTER, F. A. M. *Athletics of Today.* New York: Frederick Warne & Co., 1929. $5.00.

Foreword by Lord Burghley.

This is a general history of athletics, with accounts of the best known and feature races since 1900.

———. *Athletics of Today for Women.* New York: Frederick Warne & Co., 1930. $4.50.

WITHINGTON, PAUL. ed. *Book of Athletics.* Rev. ed. Boston: Lothrop, Lee & Shepard Co., 1922. $2.00.

1922 ed. rev. by Lothrop Withington.

1st ed. 1895, edited by Norman W. Bingham, jr.

Collection of articles on many college sports, written by experts. Practically all of the intercollegiate games are covered. Popularly written.

BASEBALL

The national game of this country has a larger number of followers than any other game; more people witness contests between baseball teams than between teams in any other sport. The daily papers cover current news thoroughly and extensively. There are several yearbooks which give statistics and results for previous years. Books, for some reason, are not numerous, magazine articles plentiful. Pamphlets of the *Spalding Athletic Library*, frequently revised, are the best source of information for the small library; they are useful in any library. A variation of the major sport is popular in schools and on the playground. Indoor baseball differs slightly from the former. Both have a feminine following of some size. Under a separate head are listed a few books dealing with them more specifically.

BERRY, ELMER. *Baseball Notes for Coaches and Players.* 4th ed. New York: A. S. Barnes & Co., 1927. $2.00.

1st ed. 1916.

Introduction by Ray L. Fisher, baseball coach at the University of Michigan and former pitcher for the New York Yankees.

"I can heartily recommend this work as a most reliable and useful reference book for all who are interested in coaching or playing our national game." *Ray L. Fisher.*

BONNER, M. G. *Big Baseball Book for Boys.* New York: McLoughlin Bros., 1931. $1.00.

A book for the boy of eleven or twelve who follows his baseball heroes. Has space for the youngster to keep his own records. "Traces the history of the game of baseball from its supposed invention in 1839 at Cooperstown, New York, by Abner Doubleday, and brings it down to the era of Babe Ruth and the present day. Includes rules for pitching, batting, base running, coaching; game rules; rules regarding balls, bats, gloves; field regulations; umpiring rules; and scoring rules and definitions." *Book Review Digest.*

BRAATHEN, S. O. *Ty Cobb, the Idol of Baseball Fandom.* New York: The Avondale Press, 1928. $2.50.

The life of Ty Cobb is more than a biography of the game's "greatest" player, it is a history of the game itself. Each season of Cobb's career is reviewed, statistics are plentiful, yet Cobb dominates the book as he did the field. A much earlier book, by Cobb himself, *Busting 'Em* (1914, New York, Clode, $1) gives in his own words many incidents of his brilliant career.

CHARNLEY, M. V. ed. *Secrets of Baseball, Told by Big League Players.* New York: D. Appleton & Co., 1927. $1.50.

The leading players of the game have contributed their viewpoints on various phases of the sport to make this interesting book. Boys will enjoy it.

DOUGLAS, BYRD. *The Science of Baseball.* Chicago: Wilson-Western Sporting Goods Co., 1922. $1.00.

Illustrated by photographs and diagrams.

"A textbook of 'inside' baseball completely covering every department and phase of baseball—how to play and coach the game." *Title page.*

EVERS, J. J., and FULLERTON, H. S. *Touching Second.* 2d ed. Chicago: Reilly & Lee Co., 1910. $1.25. o. p.

Also published with the title *Baseball in the Big Leagues.*

"The history of the national game; its development into an exact mathematical sport; records of great plays and players; anecdotes and incidents of decisive struggles on the diamond; signs and systems used by championship teams." *Title page.*

Old but still popular.

HARRIS, STANLEY. *Baseball, How to Play It.* New York: F. A. Stokes Co., 1925. $1.00.

A book for boys by one of the game's most colorful younger stars. Harris has had wide experience as both player and manager and tells how to play every position on the team; his comments on pitching will be helpful to the young boy. Harris reviews his own career in his *Playing the Game* (1925, Stokes, $1.50).

JOHNSON, HAROLD. comp. *Who's Who in Major League Baseball.* Chicago: Buxton Pub. Co., 1933. $3.00.

Will be very useful as a reference tool in almost any library. "Personal histories and photographs of officials and players of the major leagues, with each player's record, biographical sketches of the major league baseball writers and radio announcers, and the history and official rules of baseball. Indexed." *Booklist.*

MCGRAW, J. J. *My Thirty Years in Baseball.* New York: A. & C. Boni, 1923. $2.00.

The late manager of the New York Giants, who was part and parcel of the game, had a most brilliant career. He writes his story for young and old.

MATHEWSON, CHRISTOPHER. *Pitching in a Pinch.* New York: G. P. Putnam's Sons, 1912. $1.50.

There is also a boy scout edition, published by Grosset, for 85c.

One of the immortal figures of baseball, Christy Mathewson was also as clean a sport as ever played the game. He reviews his own brilliant career and adds many bits of interesting notes on big-league play and players. His life is interesting to all boys and baseball fans.

RUTH, G. H. *Babe Ruth's Own Book of Baseball.* New York: G. P. Putnam's Sons, 1928. $2.50.

The title expresses the contents. An illustrated narrative of the great slugger's career with playing pointers.

WARDLAW, C. D. *Fundamentals of Baseball.* New York: Chas. Scribner's Sons, 1924. $1.75.

Brief, systematic study of baseball taken up by each position. There is a chapter for coaches. Illustrated with excellent photographs. One of the best on the game.

INDOOR BASEBALL AND PLAYGROUNDBALL

BANCROFT, J. H., and PULVERMACHER, W. D. *Indoor Baseball* (in their *Handbook of Athletic Games,* p. 313–344. New York: Macmillan Co., 1916. $2.00.)

The game as it differs from the better known form is clearly brought out by word and diagram. Rules, play, history, officials, and outfit.

FROST, HELEN, and WARDLAW, C. D. *Indoor Baseball* (in their *Basketball and Indoor Baseball for Women,* p. 89–154. New York: Chas. Scribner's Sons, 1920. $1.75.)

Well illustrated. For the coach of women's teams this is probably the best available.

PALMER, G. E. *Baseball for Girls and Women* (Athletics for Women). New York: A. S. Barnes & Co., 1929. $2.00.

Covers both indoor and outdoor baseball as adapted for women. Official rules for women given.

FOOTBALL

Football at the present time ranks second only to baseball as a national sport. It is the leading game of colleges; now has strong professional following, and independent teams are numerous. Intersectional games between leading teams draw more than one hundred thousand spectators; the games for the national professional championship fill such large stadiums as the Polo Grounds. There is an abundance of book literature covering the game, but for this list only a few are given. The average library will need the general books on football and probably a few of the special ones; the large library and the college library must have those covering all phases of the game. In the subdivisions which have been used overlapping occurs; under special phases of the game several of the entries are not annotated as the subject matter is clearly indicated by the title.

General and Biographical

CAMP, W. C. *The Book of Football.* New York: Century Co., 1910. $2.00. 0. p.

A survey of the game by the "father" of football. Includes his all-time All-America team up to 1910 with comment on each player. Amusing today, but valuable for the history of the game, is Camp and Deland's *Football* (1896, Houghton, o. p.). The 1896 rules as given in this work show the great development and change which have been wrought in less than forty years.

DAVIS, P. H. *Football.* New York: Chas. Scribner's Sons, 1911. $2.50. o. p.

Mr. Davis was the game's historian and statistician, a member of the rules committee for six years and closely associated with the game throughout his life. He died June 5, 1934. This book, together with those of Walter Camp, covers the history of the game and has the playing reports of some of the earliest of the big games.

LOVELACE, D. W. *Rockne of Notre Dame.* New York: G. P. Putnam's Sons, 1931. $2.00.

"A biography of a famous sportsman and lover of sport for sport's sake, with a background of football during the last twenty years." *Doris Hoit.*

MARCH, H. A. *Pro Football: Its "Ups and Downs."* New York: Pub. by the author, 1934. $1.00.

"A history of post-graduate football, with a foreword by Grantland Rice. Illustrated from photographs and from drawings by Burris Jenkins." *New York Times Book Review.*

POWEL, H. W. H. *Walter Camp, the Father of American Football.* Boston: Little, Brown & Co., 1926. $2.00.

Introduction by E. K. Hall.

"An account of Camp's football career and his contribution to the game, written primarily for schoolboys. An appendix lists Camp's All-American football teams from 1889 through 1924. One chapter and an appendix describe the physical exercises called the 'daily dozen.'" *Pittsburgh.*

ROCKNE, K. K. *The Autobiography of Knute Rockne.* Indianapolis: Bobbs-Merrill Co., 1931. $2.50.

"Edited with a prefatory note by Bonnie Skile Rockne (Mrs. Knute K. Rockne) and introduction and postscript by Father John Cavanaugh." *Title page.*

It is the famous coach's own story. A good share of it appeared in magazine articles.

ROPER, W. W. *Football, Today and Tomorrow.* New ed. New York: Duffield & Co., 1931. $2.50.

1st ed. 1927.

A widely known coach, Roper has written this book for the general public and tells much of the game as it is today and as it should be in the future.

STAGG, A. A., and STOUT, W. W. *Touchdown!* New York: Longmans, Green & Co., 1927. $2.50.

For forty years Stagg was on the Midway at the University of Chicago. He stands for the highest meaning of sportsmanship on and off the gridiron.

"It is a history of American football." *Standard Catalog. Fine Arts.*

STUHLDREHER, H. A. *Knute Rockne, Man-Builder.* Philadelphia: Macrae Smith Co., 1931. $2.50.

The author was one of Rockne's immortal Four Horsemen.

This is less of a biography than Rockne's own story and gives more about the famous coach as he was known in the sports world. Two other biographies of Rockne were also published in 1931; one by Brown with the title *Rockne* (1931, Chicago, Reilly, $2.50.), the other with the title *Rockne, Idol of American Football,* by Harron (1931, Burt, $1.00). These, with the others noted, indicate something of the public interest in the great coach and his life.

WEYAND, A. M. *American Football; Its History and Development.* New York: D. Appleton & Co., 1926. $3.00.

A history of the game. A valuable reference tool for libraries and followers of the game. It includes a complete list of Walter Camp's All-American teams from 1889 to 1925, a list of high point scorers, long runs, record kicks and passes, and is full of records of games and many scores. Indexed.

WOOD, W. B. *What Price Football.* Boston: Houghton Mifflin Co., 1932. $1.75.

One of Harvard's greatest all-round athletes, Wood was also a student of the first order, being elected to Phi Beta Kappa. He was an All-American quarterback and captain of the Harvard team in 1931. His defense and analysis of the game, written almost before he finished his career, is a worth-while contribution.

Coach and Player

BACHMAN, C. W. *Manual of Football for High School Coaches.* 3d ed. rev. Manhattan: Department of Industrial Journalism and Printing, Kansas State College, 1926. $3.00.

The author was formerly coach at Kansas State and is now head coach at Michigan State.

A manual which is useful for both coach and player.

BARBOUR, R. H., and SARRA, LAMAR. *Football Plays for Boys.* New York: D. Appleton-Century Co., 1933. $1.25.

"With rules and strategies for touch football." *Title page.*

This recent book, especially for boys, will be greatly in demand when the season begins in September. Plays diagrammed and explained.

CAMP, W. C. *Football Without a Coach.* New York: D. Appleton & Co., 1920. $1.50.

"The book comes as near to taking the place of an expert coach as printed words can." *Independent.*

CRISLER, H. O., and WIEMAN, E. E. *Practical Football.* New York: McGraw-Hill Book Co., 1934. $3.00.

First published June, 1934.

The authors are coaches at Princeton; Crisler formerly was at Minnesota, Wieman at Michigan and Minnesota.

"A practical guide for teaching and developing football technique by two well-known coaches. The chief emphasis is on blocking, tackling, position play, the kicking game, the running game, offensive plays, generalship, and defensive planning." *Wilson Bulletin.*

LITTLE, LOU. *Lou Little on Football.* New York: Harcourt, Brace & Co., 1934. $2.00.

The author is head coach at Columbia University where his teams have been more than average, climaxing with the conquest of Stanford in the Rose Bowl game of 1934. The book is practical and useful.

LOWMAN, G. S. *Practical Football.* New York: A. S. Barnes & Co., 1927. $3.00.

". . . Stresses fundamentals and the best methods of teaching every phase of modern football." *American Textbook Service.*

ROCKNE, K. K. *Coaching.* New York: Devin-Adair Co., 1925. $4.00.

New rev. ed. was published in 1930 for $5.00.

An excellent manual for the coach by one of the most successful coaches of the day. The Rockne system is one of the best known systems in use.

ROPER, W. W. *Winning Football.* New York: Dodd, Mead & Co., Inc., 1920. $2.00.

The former Princeton coach has a book full of action and ideas. It should interest high school players and coaches in particular and spectators and fans in general. He believes that brains count more than brawn in this game.

WARNER, G. S. *Football for Coaches and Players.* Palo Alto, Cal.: Pub. by the Author, 1927. $5.00.

First published in 1912 with title *A Course in Football for Players and Coaches.*

The Warner system is, like the Rockne, one of the most widely used and most successful.

ZUPPKE, R. C., and OLANDER, M. M. *Coaching Football.* Champaign, Ill.: Bailey & Himes, 1930. $3.50.

Zuppke is head coach at Illinois, and as a teacher of both players and coaches is well known. This book is one which every coach should know about.

Special Phases

BERRY, ELMER. *The Forward Pass in Football.* New York: A. S. Barnes & Co., 1921. $.50.

A short treatise of one of the most important and most spectacular phases of football.

DAWSON, LOWELL. *Quarterback Strategy.* Minneapolis: Dawson, 1932. $1.00.

". . . a text of directing the team on the field." *Title page.*

GRAVES, ERNEST. *The Line Man's Bible.* New York: Book Pub. Press, 1921. $3.00.

The author coached the Army in 1905–06, 1912–20 and was at Harvard in 1907–08.

His book is practical and to the point. Will be useful for player and coach. Oakes' book is more up to date and therefore has more of the recent trends.

LAMBERT, F. A. *Football Officiating and Interpretation of the Rules.* Columbus, Ohio: R. G. Adams & Co., 1926. $2.50.

For all officials. Now out of date, but useful because it gives the basic principles of good officiating.

MILLS, LEROY N. *Kicking the American Football.* New York: G. P. Putnam's Sons, 1932. $2.50.

The importance of this phase of the game is not fully appreciated. Michigan's past successes are ample illustration of its worth.

OAKES, B. F. *Football Line Play, for Players and Coaches.* New York: A. S. Barnes & Co., 1932. $3.00.

As player and coach Oakes is well qualified to expound this important but greatly overlooked (by spectators at least) phase of the game. He is clear and direct in his statement. Players and coaches should use this and Graves'.

Training and Conditioning

LANGMACK, H. C. *Football Conditioning.* New York: A. S. Barnes & Co., 1926. $1.50.

Not plays and playing, but how to be ready for the hard knocks. This is the system Knute Rockne used in conditioning Notre Dame teams.

STEVENS, M. A., and PHELPS, W. M. *Control of Football Injuries.* New York: A. S. Barnes & Co., 1933. $3.00.

"This very interesting and instructive work is well worth careful study by anyone having any connection with an athletic organization. While it is primarily a detailed consideration of football injuries, their prevention and treatment, a great deal of the material can be applied to all other branches of sports and even to ordinary civilian practices and injuries." *W. J. Stewart* in the *American Journal of Public Health.*

For the Spectator

CAMP, W. C. *Football for the Spectator.* Boston: The Gorham Press, 1911. $.75.

A small practical handbook for the people in the stands, now greatly out of date but interesting for its historical data. The duties of the officials in that period are of note.

HAUGHTON, P. D. *Football and How to Watch It.* New ed. Boston: Little, Brown & Co., 1924. $3.00.

1st edition published in 1922.

One of the best for the spectator. Well illustrated with photographs of Harvard teams, of which the author was coach. As the game is explained clearly and intelligently this is a real contribution. Boys will find this interesting and instructive.

WILCE, J. W. *Football; How to Play It and How to Understand It.* New York: Chas. Scribner's Sons, 1924. $2.00.

By the former head coach at Ohio State.

"This book is intended to help boys and young men who are trying for the football team as well as those who are interested in watching the game." *Preface.*

YOST, F. H. *Football for Player and Spectator.* Ann Arbor, Mich.: Univ. Pub. Co., 1905. $1.50.

Yost is Athletic Director at the University of Michigan.

"Hurry-up" Yost's ideas on the game thirty years ago are still interesting to the football fan. This is now out of date, but is an idea of the game as it was then, with the flying wedge and mass formations.

BASKETBALL

Basketball was originally a minor college sport. Today it is second only to football as a drawing card and is participated in by many more than football. Its greatest development, however, has been in the independent field. The number of teams taking part in the hundreds of tournaments in all parts of the country is astounding. The number of books on the game has not kept pace with the growing interest. No books have been published in the past two or three years which compare in quality with those of five and ten years ago. The woman's phase of the game, a separate study in itself, has four or five excellent books for coach and player. The two games, the men's and the women's, are not alike. The tendency is, however, for women to adopt certain features of the men's game, with the result that the play has become speeded up and is therefore more interesting.

For Men

ALLEN, F. C. *My Basketball Bible.* Kansas City, Mo.: Pub. by the author, 1924. $4.00.

An excellent book for coach and player. Every phase of training and conditioning is covered. The author is one of the most successful coaches in the Middle West. Illustrated with diagrams.

BLISS, J. G. *Basketball.* Philadelphia: Lea & Febiger, 1929. $2.50.

Foreword is by Dr. Lynn W. St. John of Ohio State.

A textbook for the coach. The illustrations in this are inferior to those in Allen.

CHANDLER, W. A., and MILLER, G. F. *Basketball Technique.* Menomonie, Wis.: Printed by Dunn County News, 1922. $1.50.

Chandler is coach at Marquette where he has turned out teams ranking with the nation's best. This should be useful for any coach.

HOLMAN, NAT. *Winning Basketball.* New York: Chas. Scribner's Sons, 1932. $2.00.

Successful as a coach at City College in New York and also as a player on the Original Celtics, world's professional champions, Nat Holman is well qualified to write on the game. He has both player and coach viewpoints.

MATHER, E. J., and MITCHELL, E. D. *Basketball.* New York: A. S. Barnes & Co., 1925. $2.00.

An earlier edition was published in 1922.

Mr. Mather was basketball coach at Michigan at the time of his death; Mitchell is head of the Intramural Department at the same institution.

Their book is of a practical nature, based upon sound theory. Will be useful to the coach and his assistants.

MEANWELL, W. E. *Science of Basketball for Men.* Madison, Wis.: H. D. Gath, 1924. $3.50.

The 1922 edition had the title *Basketball for Men.*

The author is coach at Wisconsin.

An excellent book covering all phases of the game for coach and player.

NATIONAL FEDERATION OF STATE HIGH SCHOOL ATHLETIC ASSOCIATIONS. *Basketball Play Situations.* 5th ed. Chicago: Pub. by the Association, 1933. $1.00. Pam.

Interpretation of rules for coach and player, with rulings. Practical and useful. Frequently revised.

VEENKER, G. F. *Basketball for Coaches and Players.* New York: A. S. Barnes & Co., 1929. $3.00.

At the time of writing this book, Veenker was head coach at Michigan. He is now Director of Athletics at Iowa State College.

A book covering the game from all angles, including conditioning. Illustrated with diagrams.

WARDLAW, C. D., and MORRISON, W. R. *Basketball; a Handbook for Coaches and Players.* New York: Chas. Scribner's Sons, 1921. $2.00.

"As a whole, the book is the most complete treatise (1921) on the sport yet written." *Literary Review.*

For Women

ANDERSON, L. E. *Basketball for Women.* New York: Macmillan Co., 1929. $1.75.

Primarily for the woman's coach but useful for players as well. Well illustrated.

FISH, M. E. *The Theory and Technique of Women's Basketball.* Boston: D. C. Heath & Co., 1929. $1.68.

Useful as a textbook for instructing coaches and players; by a well-known woman's authority.

FROST, HELEN, and WARDLAW, C. D. *Basketball for Women* (in their *Basketball and Indoor Baseball for Women,* p. 3–83. New York: Chas. Scribner's Sons, 1920. $1.75.)

Every angle of the game as played by women is fully covered. Well illustrated.

FRYMIR, A. W. *Basketball for Women* (Athletics for women). New York: A. S. Barnes & Co., 1928. $2.00.

"A short history of basketball for women is given first. The fundamentals of the game are explained in detail by the use of diagrams and photographic illustrations. There is a short bibliography at the end of each section." *Providence.*

TRACK AND FIELD ATHLETICS

As the fourth major sport among American colleges, track and field athletics play an important part. It is the only one of the four which the individual can continue by himself without the need of an organized team. The individual runner may enter any meet and gain glory unassisted. Today the interest in these events attracts thousands of spectators. The Olympic games, originally confined to track and field but now including practically all phases of sport life, are the goal for every athlete. Their renewal has been one of the prime reasons for the great assault on records in the past twenty years, an assault which keeps gaining daily. So important are these Olympic games that the literature about them is fairly comprehensive. Books under both Olympic games and this head are closely related and will overlap.

For material on the many individual events under track and field athletics, the *Spalding Athletic Library* will be most useful. Practically every event is covered and the pamphlets are frequently revised and kept up to date.

BUTLER, G. M. *Modern Athletics.* New York: Macmillan Co., 1929. $4.00.

How to train and develop yourself into a track star. Written for the young athlete by a famous Cambridge athlete. Diagrams and photographs should be studied.

CLARK, E. H. *Track Athletics Up to Date.* Rev. ed. New York: Duffield & Co., 1929. $2.00.

1904 and 1910 editions by Graham and Clark with the title *Practical Track and Field Athletics.*

The author, one of the greatest all-round athletes of the century, "combines clear statement with the highest ideal of sport." *Booklist.*

FRYMIR, A. W. *Track and Field Athletics for Women* (Athletics for women). New York: A. S. Barnes & Co., 1930. $2.00.

The woman's side of track and field capably discussed by an authority. Useful for teachers.

GILL, H. L. *Track and Field Athletics for Coach and Contestant.* 2d rev. ed. Champaign, Ill.: Bailey & Himes, 1925. $3.75.

Head coach at Illinois, his 1934 team won the Big Ten title. Gill's book should be in the hands of every coach.

JONES, T. E. *Track and Field; Principles and Details of Training and Practice for Each Event.* New York: Chas. Scribner's Sons, 1925. $2.00.

Jones is track coach at the University of Wisconsin.

This is a book which states clearly and intelligently the best principles and methods in use. It is "a practical manual describing the various events of track and field athletics and outlining the best methods, technique, and training for each . . ." *Pittsburgh.*

OLDS, L. W. *Track Athletics and Cross-Country.* New York: A. S. Barnes & Co., 1930. $2.00.

He is track and cross-country coach at Michigan State Normal College, Ypsilanti.

A book for both coach and runner. Olds has developed some of the best distance runners in the country; his book tells his methods.

PADDOCK, C. W. *Fastest Human.* New York: Thomas Nelson & Co., 1932. $2.00.

"The famous sprinter tells of his rise in the world of sport, his methods of training, and his code of sportsmanship." *Doris Hoit.*

———. *Track and Field.* New York: A. S. Barnes & Co., 1933. $2.50.

At one time or another, Paddock held all of the world records up to the quarter mile. He covers the subject thoroughly and knowingly. Appendices are interesting. Bibliography is good.

ROBERTSON, LAWSON. *Modern Athletics.* New York: Chas. Scribner's Sons, 1932. $2.00.

Robertson was head coach of the 1924, 1928, and 1932 American Olympic track and field teams.

He has a sane and sensible book, quite general in its treatment, but one which any athlete can read with profit. There is a chapter on diet and injuries which is important.

OLYMPIC GAMES

Each of the games since the first revival in 1896 have official reports with the records and results of the meetings. In this bibliography only those for the last (1932) games are given. The others are of a similar nature though less extensive. In addition to the reports, which have ap-

peared in more than one form, there are included several books which cover the history of the Olympic games and one title on a similar set of games held in Paris during the summer of 1919.

AMERICAN OLYMPIC COMMITTEE. *Report: Games of the Xth Olympiad, Los Angeles, July 30–August 14, 1932; III Olympic Winter Games, Lake Placid, New York, February 4–13, 1932.* New York: Pub. by the Committee, 1933. $2.00.

This report gives a summary of events, some photographs, and an outline of the lesser reports. It is not the full descriptive report which was published for public sale.

HARLAN, HUGH. *History of Olympic Games.* Los Angeles: Sports Research Bureau, 1932. $1.00.

Published in 1931 as a pamphlet for $.25.

Traces the games from the ancient times to the present. It includes all Olympic and world records and title holders except those of the Xth Olympiad.

Official Story of the Third Olympic Winter Games. Lake Placid, N. Y.: Wyer, 1932. $1.50.

Does not have mass of detail and data on the committee preparations which the official committee report gives.

STUFF, H. S. comp. *The Story of the Olympic Games.* Los Angeles: Times-Mirror, 1932. $.50.

Brief history, records, and review of the 1932 games.

XTH OLYMPIAD COMMITTEE OF THE GAMES OF LOS ANGELES, U. S. A., 1932. *The Games of the Xth Olympiad, Los Angeles, 1932.* Los Angeles: Pub. by the Committee, 1933. $5.50.

There is a beautifully edited deluxe edition for $15.00.

This, the official and full report, gives a complete review of all events, the names and winners of contesting athletes and events, a financial report, records of all events, and a survey of the work preparatory to the actual staging of the meet. The photographs are the official ones and, in themselves, make the volume worth-while.

THIRD OLYMPIC WINTER GAMES COMMITTEE. *Official Report: III Olympic Winter Games, Lake Placid, 1932.* Lake Placid, N. Y.: Pub. by the Committee, 1932. $1.50.

Contains complete records and results of the winter games. Excellently illustrated with action pictures.

THORPE, JAMES, and COLLISON, T. F. *Jim Thorpe's History of the Olympics.* Los Angeles: Wetzel Pub. Co., 1932. $2.50.

Foreword by Lawson Robertson.

Jim Thorpe, the Carlisle Indian, is generally considered to have been the greatest all-round athlete of all time. His record in the Olympic games is impressive, covering several of them. His book will interest any athlete.

YOUNG MEN'S CHRISTIAN ASSOCIATION. *Inter-Allied Games, Paris 22d June to 6th July, 1919.* Paris: Pub. by the Games Committee, 1919. Gratis.

These games, held soon after the War ended, were similar to the Olympics. Held in Pershing stadium, they were the first international games after the War. The contestants were all in the military service. The preparation and organization work previous to the games is interesting.

GOLF

One of the most popular games, both in America and in England, golf is enjoyed by young and old alike. While there has been a noticeable increase in interest in the game in the past fifteen years, the increase has been steadier than with some other sports. In surveying the literature on the game, one immediately notices the large amount. Players have been liberal in writing and the books are many. Those listed here are, for the most part, written by persons whose names are familiar to the golfer. There are several golf periodicals, the most important of which is the *American Golfer*, edited by Grantland Rice.

In dividing the books into groups, the division is not definite nor are the limits sharp; rather they are arbitrary and vague. The attempt is merely to give some idea of the general content of the book listed. A few of the English publications are listed without a note.

Improve Your Game

ALLIS, PERCY. *Better Golf*. New York: Macmillan Co., 1926. $2.00.
2d ed. rev. Published by Black in 1933. 3s6d.
Advice on how to better your game from a well-known player.

BAILEY, C. W. *The Brain and Golf*. Boston: Small, Maynard & Co., 1924. $1.25.
Mr. Bailey takes up the game from a different point of view from that usually discussed. He stresses the mental side—psychology, habit, concentration, judgment, imitation, suggestion, etc. There is a chapter on theory and practice by Bernard Darwin. Another book, and more recent, which covers this phase is Moore's *The Mental Side of Golf* (1929, Liveright, $1.75).

BARNES, J.M. *Guide to Good Golf*. New York: Dodd, Mead & Co., Inc., 1925. $2.00.
Foreword by Grantland Rice.
Well-written book with good explanatory illustrations. Barnes is a former National Open Champion.

DUNCAN, GEORGE, and DARWIN, BERNARD. *Present-Day Golf*. New York: Doubleday, Doran & Co., Inc., 1921. $3.00.
An instructive book, comprehensive, well written and readable.

LARDNER, G. E. *Cut Your Score*. New York: Viking Press, 1933. $1.00.
Foreword by Francis Ouimet.
"The book of common sense golf." *Title page.*

MARTIN, H. B. *Pictorial Golf*. New York: Dodd, Mead & Co., Inc., 1928. $2.00.
"Practical instruction for the beginner and valuable hints for the star." *Title page.*
The diagrams and clear explanations make it very useful. An older and similar book is Barnes' *Picture Analysis of Golf Strokes* (1919, Lippincott, $6.50) which has explanatory comment for all illustrations.

———. *What's Wrong With Your Game?* New York: Dodd, Mead & Co., Inc., 1930. $2.00.
Sketches of players with text make this a handy book to use in correcting your faults.

METZGER, SOL. *Putting Analyzed.* New York: Doubleday, Doran & Co., Inc., 1929. $1.50.

An analysis of this bothersome stroke with suggestions and hints for improvement.

MITCHELL, ABE. *Essentials of Golf.* New York: Doubleday, Doran & Co., Inc., 1927. $3.00.

Emphasis is placed on grip and stance although play of shots and use of clubs is covered. While it is illustrated, it is not as easy to follow as Martin's books which are largely pictures and diagrams.

MORRISON, A. J. *A New Way to Better Golf.* New York: Simon & Schuster, 1932. $2.00.

Foreword by Rex Beach.

"Golf is not a matter of hitting a ball, but of swinging a club. Hitting the ball is merely incidental to making the swing." ***Author's note.***

OUIMET, FRANCIS. *Golf Facts for Young People.* New York: Century Co., 1921. $1.75.

An admirable book for the boy or girl who wants good advice when first beginning the game. By the Captain of the American Walker Cup team of 1934. Libraries would do well to add this to their children's collection.

SCHLEMAN, H. B. *Group Golf Instruction.* New York: A. S. Barnes & Co., 1934. $1.00.

With the increasing number of golf courses, especially municipal ones without professionals, the problem of receiving instruction *en masse* is faced. This meets the need excellently and can be used for class as well as on the course. Illustrated with photographs and diagrams. Glossary of terms, short bibliography.

VARDON, HARRY. *The Gist of Golf.* New York: Doubleday, Doran & Co., Inc., 1922. $2.00.

The matter of choice and use of clubs is dealt with by Mr. Vardon in a thorough manner. How and when to play the mid-iron, niblick, mashie, putter, and driver.

WETHERED, JOYCE, and others. *The Game of Golf* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1931. $6.00.

The work of several authorities, mostly British, has resulted in this being a comprehensive book for the real golf enthusiast. It is not a book to be read hastily. The history of the game in England is taken up as well as stroke and play.

——— and WETHERED, ROGER. *Golf From Two Sides.* New ed. New York: Longmans, Green & Co., 1925. $2.25.

Brother and sister both are well-known stars of the game. To have both the man's and the woman's viewpoint in one book is unusual and when it is done so well, the result is a real contribution to golf literature.

For Women

COLLETT, GLENNA. *Golf for Young Players.* Boston: Little, Brown & Co., 1926. $1.50.

The author is now Mrs. Glenna Collett Vare.

Simply told descriptions of the fundamental strokes of the game, by a master hand. Written especially for the young girl. Well illustrated.

———. *Ladies in the Rough.* New York: Alfred A. Knopf, 1928. $2.50.

Foreword by Bobby Jones.

The former National champion tells of her career in golf, how she plays, and includes enough common sense technique to make it a useful guide for men as well as for women.

LEITCH, CECIL. *Golf*. Philadelphia: J. B. Lippincott & Co., 1922. $3.00.

A prominent English star of ten or twelve years ago, the author tells incidents from her own playing days and passes on to the reader advice which only the expert can give.

About Golfers

BEGBIE, HAROLD. *J. H. Taylor; or, The Inside of a Week*. London: Mills & Boon, Ltd., 1925. 2s 6d.

"An account of a week in the late autumn of 1924 spent with Mr. Taylor, then five times winner of the British open golf championship. Mr. Begbie reports on their conversation on golf, on Mr. Taylor's earlier career, on life in general." *Pittsburgh*.

EVANS, CHARLES. *Chick Evans' Golf Book*. New York: T. E. Wilson Co., 1921. $3.50.

Long a prominent figure in golf circles, Mr. Evans believes that persistence is the road to golf success. In reading his book, which tells many events of his long career, it is seen that this was his way to success.

JONES, R. T., and KEELER, O. B. *Down the Fairway*. New York: Minton, Balch & Co., 1927. $3.50.

Blue ribbon books, $1.00.

A large portion of this appeared serially in *Liberty*.

Bobby Jones is the only person to ever win the four major golf championships in one season: National Open, National Amateur, British Open, and British Amateur. This book by the greatest of all golfers about himself should interest many.

OUIMET, FRANCIS. *A Game of Golf*. Boston: Houghton Mifflin Co., 1932. $2.50.

Cheaper edition, published by Hutchinson, 1934, sells for 5s.

"Pleasant reminiscences of the 1931 amateur champion, from the days when he 'lived across the street from the Country Club' in Brookline." *Pittsburgh*.

TOLLEY, C. J. H. *The Modern Golfer*. New York: Alfred A. Knopf, 1924. $1.75.

The English star, who has frequently played in this country, intersperses the story of his golfing days with comments on strokes, style, and shots. The larger portion of the book deals with English tournament play.

For the Dub

CORTISSOZ, ROYAL. *Nine Holes of Golf*. New York: Chas. Scribner's Sons, 1922. $1.25.

"Informal essays, not on how to play golf, but on how to enjoy it even though a 'duffer.'" *Pittsburgh*.

Golf for Occasional Players. New York: Robert M. McBride & Co., 1922. $.75.

"By a veteran." *Title page*.

RICE, GRANTLAND, and BRIGGS, CLARE. *The Duffer's Handbook of Golf*. New York: Macmillan Co., 1926. $3.50.

The combined work of a skillful cartoonist and a well-known sports writer. If you have never broken a hundred you should read this.

WILSON, H. L. *So This Is Golf!* New York: Cosmopolitan Book Corp., 1923. $.75.

To be read by every duffer, not to learn golf, but for the pleasure of reading it. The cartoon sketches add to the book.

WODEHOUSE, R. G. *Golf Without Tears.* New York: A. L. Burt Co., 1924. $1.00.

Light reading for the Sunday golfer.

Care and Construction of the Course

COLT, H. S., and ALISON, C. H. *Some Essays on Golf Course Architecture.* London: "Country Life," 1920. 4s 6d.

CUBBON, M. H., and MARKUSON, M. J. *Soil Management for Greenskeepers.* Amherst: Pub. by the authors, Department of Agronomy, Massachusetts State College, 1933. $2.00.

"A manual for golf course managers which will be useful to anyone who wants information on successful lawn growing. Part one deals with the chemistry of soils and with methods of fertilization; part two with drainage problems of the golf course." *Booklist.*

HUNTER, ROBERT. *The Links.* New York: Chas. Scribner's Sons, 1926. $4.00.

The construction of golf courses and the problems which it involves. A valuable book which "will interest all golfers and should be in the library of every golf secretary." *Spectator.*

The Seeding and Care of Golf Courses. Marysville, Ohio: O. M. Scott & Sons Co., 1927. $.50.

COURT GAMES

Lawn tennis, badminton, squash tennis, court tennis, and racquets are included under this head. With the exception of lawn tennis, for which there is much in print, the books are scarce. Pamphlets and magazine articles comprise almost the entire source for written material on the latter four. Only tennis (lawn tennis) and badminton are given a separate head in this compilation as the remaining three are so closely allied that material on all is found in the same books.

LAWN TENNIS

Lawn tennis, or as it is more popularly known, tennis, has become one of the leading individual games of America. While golf has an older group of followers, tennis, being more strenuous, attracts the youngsters. Few are the great internationalists who have turned thirty; many are in their early twenty's. The Davis Cup, symbolic of world tennis supremacy, is competed for by more nations than any other trophy. For the women there is the Wightman Cup, a similar emblem, but confined to American and English competition. Both United States and Canada have national organizations which issue monthly periodicals covering the game; abroad, England and France have similar publications. This game is one of the few which is truly an international sport. The material here listed is divided into three heads; that by the women in many cases falls in one or both of the other heads.

General and Historical

MERRIHEW, S. W. *The Quest for the Davis Cup.* New York: American Lawn Tennis, 1928. $4.00.

The author is editor of *American Lawn Tennis* and has been closely connected with the game for more than twenty years. This is a history of Davis

Cup competition and being such is really a history of the game and its leading players.

SLOCUM, H. W. *Lawn Tennis in Our Own Times.* New York: Spalding Bros., 1890. o. p.

One of the old masters, Slocum wrote this book about the game as it was played in the '80's. His summary of the tournaments of the day is interesting and provides a written record of these early matches.

TILDEN, W. T. *Match Play and the Spin of the Ball.* New York: American Lawn Tennis, 1925. $4.00.

The book is divided into two parts. The first is by Tilden and tells the importance of grip, footwork, timing, and strategy with names of stars who use each or are known for certain types of games. Part two is by S. W. Merrihew, who edits the book, and covers Tilden's career. Any book which reviews the playing days of Tilden, which days are not yet over, is not merely a book about one person but is a summary of top-notch tennis throughout the world for a period of more than ten years. Tilden is, unquestionably, the game's most colorful star if not the greatest of all time.

UNITED STATES LAWN TENNIS ASSOCIATION. *Fifty Years of Lawn Tennis in the United States.* New York: Pub. by the Association, 1931. $3.00.

Issued in connection with the golden jubilee of the United States Lawn Tennis Association in 1931. This is a history of American tennis surveying the history and development of playing methods. The outstanding figures of the game have contributed to this publication.

WIGHTMAN, H. H. *Better Tennis.* Boston: Houghton Mifflin Co., 1933. $1.75.

As Hazel Hotchkiss, Mrs. Wightman was one of the game's leading players; as Mrs. Wightman she still holds her own. The Wightman Cup will always cause her name to be remembered and is the highest trophy for team tennis among women. She covers lawn tennis as she played it and gives good advice to the player, whether man or woman.

Playing the Game

BEASLEY, MERCER. *How to Play Tennis.* New York: Doubleday, Doran & Co., Inc., 1933. $2.00.

Mr. Beasley is one of the most successful coaches in the country and has his own system. In this book he sets forth his principles. Some of his pupils are: Ellsworth Vines, Frankie Parker, Clifford Sutter, and Wilmer Allison.

BURNS, JAMES. *How to Play Tennis.* New ed. New York: Macmillan Co., 1931. $1.00.

Foreword by Allison Danzig.

1st edition 1915 (Outing handbooks).

This edition brings his book up to date. Mr. Burns has had much success as a coach and stresses the mechanical side of the game. Should not be confused with Beasley's book of the same title.

DOEG, J. H., and DANZIG, ALLISON. *Elements of Lawn Tennis.* New York: Coward-McCann, Inc., 1931. $2.00.

1933. Cheaper ed. London, Eyre, 2s6d.

At the time of his retirement from active tennis, Doeg was the leading left-handed player of the nation. He was the National champion in 1930. The authors take each stroke of the game separately and explain how and when to use it.

LACOSTE, J. R. *Lacoste on Tennis.* New York: Wm. Morrow & Co., 1928. $2.50.

The great French player and former United States title-holder tells his own story of the struggle he had from his youth until he reached the pinnacle in winning the Wimbledon championship. Tactics and strokes are discussed with comments on the leading players. Well illustrated.

MYERS, A. W. *Lawn Tennis, Its Principles and Practices.* (The Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1930. $5.00.

A scholarly treatise covering many aspects of the game. Rules are included.

PARET, J. P. *Methods and Players of Modern Lawn Tennis.* 3d ed. New York: American Lawn Tennis, 1931. $4.00.

First published in 1915.

Now brought up to date, it includes opinions of most of the leading players on various aspects of the game. Paret is one of the leading authorities on tactics and has written several good books. Two of his best, one for the more advanced player, the other for the younger and less experienced person, are: ***Psychology and Advanced Play of Lawn Tennis*** (1927, New York, American Lawn Tennis, $4.00) and ***Mechanics of the Game of Lawn Tennis*** (1926, New York, American Lawn Tennis, $4.00).

RANDLE, D. D., and HILLAS, MARJORIE. ***Tennis Organized for Group Instruction.*** New York: A. S. Barnes & Co., 1932. $1.60.

Primarily for the physical education teacher who has large classes to instruct.

TILDEN, W. T. *Art of Lawn Tennis.* New York: George H. Doran Co., 1922. $2.00.

Parts one and two of this are now largely superseded by his ***Match Play and the Spin of the Ball.*** It includes a summary of the 1921 matches and of the leading players of several countries.

———. *Common Sense of Tennis* (Common sense library). New York: Simon & Schuster, 1924. $1.50.

"The author is concerned more with tennis personalities than with technique, although some pointers and suggestions are included and the critical remarks on famous players are often as instructive as they are interesting." *Booklist.*

———. *Singles and Doubles.* New York: George H. Doran Co., 1923. $2.00.

"Big Bill" lives with tennis, it is his life. His books are always written with the intention and hope that they will help someone to improve his game and thereby improve the whole game of tennis. He writes well and, being the world's greatest player, knows what he is talking about. This book has history as well as fine points of the game. It would be well for every tennis player to have Tilden's books at hand.

VAILE, P. A. *Modern Tennis.* New York: Funk & Wagnalls Co., 1917. $2.00.

1907 edition had title: ***Modern Lawn Tennis.***

This gives detailed directions for the beginner. The author has written many books of real worth on tennis, but most of them are old and now out of date. Tilden's *Art of Lawn Tennis* is preferable for use today.

By and for Women

ANDERSON, L. E. *Tennis for Women* (Athletics for Women). New York: A. S. Barnes & Co., 1926. $1.60.

The elements of the game for use in teaching others or for learning the game for yourself.

BJURSTEDT, MOLLA, and CROWTHER, SAMUEL. ***Tennis for Women.*** New York: Doubleday, Page & Co., 1916. $1.25.

Strokes and style best adapted to women players as gained from her own wide experience. Now Mrs. Mallory, she was National champion a number of times.

JACOBS, H. H. *Modern Tennis.* Indianapolis: Bobbs-Merrill Co., 1933. $2.50.

The author is the present American champion. Miss Jacobs believes that the play of women and men differs in strength of physique, not in strokes and footwork.

LENGLEN, SUZANNE. *Lawn Tennis.* New York: Dodd, Mead & Co., Inc., 1925. $1.00.

The great French player gives her own viewpoints on women's tennis as it should be played. The rules of the game and instruction on playing are covered. She has a more recent book, *Lawn Tennis for Girls* (1930, Newnes, 1s6d) which is principally for the younger and less experienced player.

NUTHALL, BETTY. *Learning Lawn Tennis.* New ed. London: Herbert Jenkins, Ltd., 1929. 2s.

The English star and former American champion tells girls how to play the game.

WILLS, HELEN. *Tennis.* New York: Chas. Scribner's Sons, 1928. $2.50.

Mrs. Helen Wills Moody, besides being the foremost woman player of today, is also an artist of skill. She has combined her playing knowledge with her art and produced a worth-while book. Mrs. Moody has always typified the highest in sportsmanship on and off the courts.

RACQUETS, SQUASH, AND COURT TENNIS

ABERDARE OF DUFFRYN, C. N. B. ed. *Rackets, Squash Rackets, Tennis, Fives, and Badminton* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1933. $5.00.

A fine contribution, giving "the history, laws and methods of play of five games presented by distinguished English players of each." *Book Review Digest.*

AMR, F. D. BEY. *Art of Squash Rackets.* London: Chapman & Hall, Ltd., 1934. 10s6d.

BANCROFT, J. H., and PULVERMACHER, W. D. *Squash Tennis* (in their *Handbook of Athletic Games,* p. 249–259. New York: Macmillan Co., 1916. $2.00).

Brief survey of game.

DANZIG, ALLISON. *The Racquet Game.* New York: Macmillan Co., 1930. $4.00.

This is probably the best book covering these three sports that has been published. The author is an expert himself and knows the games thoroughly. Each is taken up with its history, players, and play discussed in turn. Indexed; appendix is good.

MILES, EUSTACE. *Racquets, Tennis and Squash.* New York: D. Appleton & Co., 1903. o. p.

The book is interesting because of the comparison of court tennis, squash, and racquets as games and in their play and tactics. The author was one of the leading players of his day.

BADMINTON

Interest in this game has increased during the past few years, but it is still rather an unknown to the public at large. The feminine following is larger than the male at the present time. There has been little published in this country concerning the game but in England we find several good books. Most American libraries will not find a need for complete treatises on the game at the present time.

FEDDERSEN, M. H. *Badminton* (in his *Deck Sports*, pp.56–66, 1933, Boston: Hale, Cushman & Flint, Inc., $1.00).

Largely devoted to the laws of the game and their interpretation in play. Diagrams.

MACK, G. S. B. *Badminton* (Masters of Sport Series). London: George G. Harrap & Co., Ltd., 1925. 2s6d.

Foreword by Kathleen McKane. Illustrated.

POST, J. H., and SHIRLEY, M. J. *Badminton* (in their *Selected Recreational Sports for Girls and Women*, pp. 35–49. 1933, New York: A. S. Barnes & Co. $2.00.)

Badminton as a game for girls, with its history. The appendix of the book has diagrams and equipment suggestions.

THOMAS, G. A. *The Art of Badminton*. Boston: Houghton Mifflin Co., 1923. $2.00.

TRAGETT, R. C. *Badminton for Beginners*. London: Chatto & Windus, 1926. 2s6d.

Introduction by J. F. Devlin. Illustrated.

TRISCOTT, C. P. *The ABC of Badminton*. London: Athletic Pub., Ltd., 1933.

A book which treats the game adequately from all sides. Has a chapter on the game in England and in an appendix gives rules and laws. Diagrams.

FIELD GAMES

CRICKET

In England, the game of cricket is one of the most popular of all field games. In America the following is rather limited and the game is played in the East almost entirely. As yet it has not become nationalized in the United States. Because of its rather local interest in this country, the number of American books on the subject is very limited. The majority of them are of English origin. For library use, unless the library is in a city where the game is played extensively, the material found in the more general sports books will suffice. There have been entered here a few of the better known English books, by well-known authorities, with no annotations; only the large library would need them. The *American Cricketer* is the leading periodical on the sport in this country.

CAMP, W. C. ed. *Cricket* (in his *Book of Sports and Games*, p. 191–207. 1923, New York: T. Y. Crowell Co. $2.00.)

Gives a brief outline of the game with a diagram and explanation of terms.

CARDUS, NEVILLE. *Cricket*. New York: Longmans, Green & Co., 1930. $1.25.

The author has written several good books on the game and his experiences with it. This is one of his latest.

CHAPMAN, A. P. F., and others. *Game of Cricket* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1930. $7.00.

An illustrated book of much merit and wide scope.

DE SELINCOURT, HUGH. *Over! Some Personal Remarks on the Game of Cricket*. London: Gerald Howe, Ltd., 1932. 5s.

There are thirty-five illustrations by J. H. Thorpe.

JESSOP, G. L. *Cricket and How to Play It* (Masters of Sports Series). London: George G. Harrap & Co., Ltd., 1925. 2s6d.

MACLAREN, A. C. *Cricket, Old and New*. Longmans, Green & Co., 1924. $2.00.

QUAIFE, W. C. *Strokes and Styles in Cricket.* London: Ernest Benn, Ltd., 1929. 6d.

SEWELL, E. H. D. *Cricket Up-to-Date.* London: John Murray, 1931. 7s6d.

WILSON, B. B. *Hints to Young Cricketers.* London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd., 1929. 2s.

LACROSSE

Like cricket, lacrosse is an English game and in this country is confined largely to the eastern seaboard states. At the present time there are no books in print in America on the subject. *Spalding's Athletic Library* has several pamphlets and some of the more general books devote pages to it; these will meet the needs of most American libraries.

BANCROFT, J. H., and PULVERMACHER, W. D. *Lacrosse* (in their *Handbook of Athletic Games*, p. 345–375. 1916, New York: Macmillan Co. $2.00.)

Comprehensive, but rather brief covering of the game.

BARBOUR, R. H. *Lacrosse* (in his *Book of School and College Sports*, p. 307–351, 1904, New York: D. Appleton & Co. o. p.).

Article is edited by R. T. Abercrombie. Takes up a brief history of the game and its play, followed by helpful hints, then records and rules. Now somewhat out of date.

CAULKINS, E. D. ed. *Lacrosse* (in his *Intimate Talks by Great Coaches*, p. 513–550. 1930, New York: Wingate Memorial Fund, $2.00).

Talks were given on the organization of teams, the development of the game in the United States, coaching on the field, and rules interpretation.

POLO

In the past few years there has been a marked increase in the interest in polo. For many years it was strictly an eastern game and all of the great American stars were from that section. Recently, however, the middle west and southwest have developed players of sufficient ability to receive the top rating of ten goals. It is becoming nationalized. The game is played in some colleges and among clubs, but as yet is too expensive for independent teams to spring up in large numbers. While the number of American books on the game is not large, there are several which are excellent in this field. One on the training of ponies has been included and covers material which will be useful for anyone interested in the conditioning of horses.

BANCROFT, J. H., and PULVERMACHER, W. D. *Polo* (in their *Handbook of Athletic Games*. p. 407–425. 1916, New York: Macmillan Co. $2.00).

A general account of the game, useful to one who wants a brief but thorough covering of the game and how it is played.

BENT, NEWELL. *American Polo.* New York: Macmillan Co., 1929. $6.00.

To followers of the international polo matches this book will be of interest. There is a section called "Hints for Beginners," a portion of which is by Devereux Milburn and first appeared in *The Spur*. Appendices include champions, handicaps, and other interesting information.

CAMP, W. C. ed. *Polo* (in his *Book of Sports and Games*, p. 307–315. 1923, New York: T. Y. Crowell Co. $2.00).

Largely an historical discussion, but gives a very brief and general account of implements and play. Diagram of field included.

DEVEREAUX, W. B. *Position and Team Play in Polo.* New York: Brooks Bros., 1924. $1.50.

Foreword by Devereaux Milburn.

Designed principally for use of players and coaches.

KENDALL, P. G. *Polo Ponies: Their Training and Schooling.* New York: Derrydale Press, 1933. $7.50.

The training of ponies is as important to polo as the skill of the player himself. This will be useful to all who are organizing teams or have to do with the horses at all.

MARCO, PSEUD. *Introduction to Polo.* New York: Chas. Scribner's Sons, 1931. $6.00.

Foreword by Lord Wodehouse.

"In *An Introduction to Polo* Marco has given the game its most valuable text. Written for the beginner, it makes no pretense of being an elaborate treatise; yet I know of no other source where one may find so clear an explanation of what might be called 'the indispensable' of the game." *Stuart Rose* in *Books.*

FIELD HOCKEY

Field hockey as a team game for women is now receiving a great deal of emphasis in schools and colleges in all parts of the country. It has long been popular in England and many of the leading American coaches were trained abroad. There are at least four good books which deal with the sport in whole or in their larger part, as well as chapters in some of the standard general books. College libraries should have this subject represented in their collection and public libraries in some of the medium-sized cities would find them used.

BANCROFT, J. H., and PULVERMACHER, W. D. *Field Hockey* (in their *Handbook of Athletic Games,* p. 143–174. 1916, New York: Macmillan Co. $2.00).

The game, its history, terms, and summary of rules are briefly but clearly stated. Diagram.

BURR, H. V. *Field Hockey for Coaches and Players.* New York: A. S. Barnes & Co., 1930. $2.00.

Miss Burr is on the physical education staff at the University of Michigan where she gives instruction in field hockey. Her experience has been wide, both as coach and player, most of it being gained in England. This book is a valuable aid and one of the most useful. Illustrated.

CAMP, W. C. ed. *Field Hockey* (in his *Book of Sports and Games,* p. 283–290. 1923, New York: T. Y. Crowell Co. $2.00).

Somewhat similar in treatment to Bancroft and Pulvermacher, but more general. Will give a general idea of the game, but is not useful for player or coach. Diagram and names of positions included.

CUBBERLEY, H. J. *Field Hockey Analyzed for Instructor and Player.* New York: A. S. Barnes & Co., 1928. $2.00.

A detailed study of the game. The various elements that go to make up a good player and good team play are discussed, with emphasis on the teaching of the game to others.

FROST, HELEN, and CUBBERLEY, H. J. *Field Hockey* (in their *Field Hockey and Soccer for Women,* p. 3–111. 1923, New York: Chas. Scribner's Sons, $2.00).

An excellent piece of work by two well-known authorities on women's athletics. Burr and Cubberley, noted above, are more recent and bring in the latest methods.

LIDDERDALE, K. E. *Hockey for Girls and Women.* New York: Harcourt, Brace & Co., 1923. $1.25.

A well-illustrated book by an English star. The American coach and player will find it useful, also instructive.

SOCCER

In the grade schools and junior high schools soccer is the game played in the fall instead of football. In England the game is known as "association" and is played extensively. Rugby, another English game, is very similar; rules for all three vary between the two countries slightly. In this bibliography only soccer is taken up. For men Caswell's book is the most adequate; for women, Frost and Cubberley.

BANCROFT, J. H., and PULVERMACHER, W. D. *Soccer Football* (in their *Handbook of Athletic Games,* p. 427–447. 1916, New York: Macmillan Co. $2.00).

Gives playing instructions, summary of rules, outfit, and distinguishes clearly the difference between this game and rugby (English) and football (American).

CAMP, W. C. ed. *Soccer* (in his *Book of Sports and Games,* p. 353–364. 1923, New York: T. Y. Crowell Co. $2.00).

Soccer and association football are the same according to Camp. The rules, however, are not identical in England and America. Camp tells how the game is played and gives a few tips for players. Two diagrams of the field and line-up at the kick-off.

CASWELL, J. E. *Soccer for Junior and Senior High Schools.* New York: A. S. Barnes & Co., 1933. $2.00.

The best and most up-to-date contribution on the game. Each phase and position is discussed. Digest of rules included. Diagrams and photographic illustrations. Indexed. While particularly for schools, any soccer player or coach can use it successfully.

CAULKINS, E. D. ed. *Soccer* (in his *Intimate Talks by Great Coaches,* p. 79–126. 1930, New York: Wingate Memorial Fund, $2.00).

These sections were given by well-known soccer authorities and include sections on the history and development of the game, laws of the game, and how to build a team.

CURRIE, F. D. *Science of Soccer.* New York: E. P. Dutton & Co., n. d. $.70.

Soccer from an English point of view, but applicable to American use as he includes technique for each position. The appendix gives the 1918–1919 rules for the Football Association (English). There is a section devoted to soccer under adverse weather conditions, such as wind, rain, snow, etc., and another section on diet.

FROST, HELEN, and CUBBERLEY, H. J. *Soccer* (in their *Field Hockey and Soccer for Women,* p. 115–236. 1923, New York: Chas. Scribner's Sons, $2.00).

The best which has been written on soccer for women. The game is admirably discussed.

SOCCER

This is a game which is seldom heard about and not widely known. At present it is played most extensively in Michigan, especially at the University where it originated. The future of the game seems bright for its very nature makes it a game popular with boys and young men. Some school systems have substituted this game for soccer in their curriculum and where this is done libraries should have something about the sport. Unfortunately, there is almost nothing in print except magazine articles.

The one pamphlet noted below has a list of periodical articles on speedball.

MITCHELL, E. D. ed. *Official Speedball Rules* (Spalding Athletic Library). New York: American Sports Pub. Co., 1931. $.25. Pam.

This gives a history of the game, how it is played, rules, aids for coach and player, and is the best there is on the game. It has a list of references which is very important. Mr. Mitchell is the originator of the game, its beginning being in 1921.

SWIMMING AND DIVING

These water sports, while not games, as most of the other events listed in part one, are included in this section because of their close connection with intercollegiate competition, which is rapidly making them a leading sport. Interest in swimming and diving is universal. As a matter of personal safety everyone should know how to swim. For this reason there are many books on the subject, almost all of which have chapters on diving; to omit this phase makes the book inadequate. The matter of life-saving is even more important and this, also, is generally included. Every library should have several books on the subject to meet an ever-present demand. Included in the list of books given here are two which deal with special phases of swimming. One covers water polo, a game which is frequently included on a swimming program; the other concerns water pageants, how to put them on and what to have.

BARNES, GERALD. *Swimming and Diving.* New York: Chas. Scribner's Sons, 1922. $1.75.

Learning to swim, strokes, practice, life-saving, diving are simply explained and illustrations are added to improve the book's usefulness.

CORSAN, G. H. *Diving and Swimming Book.* New York: A. S. Barnes & Co., 1924. $3.00.

English edition 1931, 12s6d.

One of the best books on swimming and diving. Rules for water polo are given, although they are now somewhat old.

CURETON, T. K. *How to Teach Swimming and Diving.* v. 1. New York: Association Press, 1934. $3.00.

He is Director of Aquatics and Coach of Swimming at Springfield College, Massachusetts.

The latest book on swimming, the author takes it up from the historical, physical, and practical viewpoints. Well illustrated, bibliographies, appendix of terms, and indexed. It is a book which bids fair to become one of the most used.

DALTON, F. E. *Swimming Scientifically Taught.* 8th ed. rev. New York: Funk & Wagnalls Co., 1931. $1.75.

This is one of the old standards, always good. It was first published in 1912 and has since been revised a number of times.

DAVIESS, G. B. *Swimming.* Philadelphia: Lea & Febiger, 1932. $2.25.

Written particularly for swimming instructors, it may also be used with profit by swimmers in general. Her analysis of the form for the standard dives used in competition, pages 84–118, is particularly good.

HANDLEY, L. DEB. *Swimming and Watermanship* (Outing handbooks). New York: Macmillan Co., 1918. $1.00.

Takes up the various strokes, life-saving, diving, plunging for distance, floating, water polo, and other water games. It is a good all-round book for the swimmer, although now rather old.

McCormick, O. *Water Pageants.* New York: A. S. Barnes & Co., 1933. $2.00.
Games and stunts for water carnivals and how to put on a pageant.

Riggin, Aileen. *Modern Swimming and Diving.* New York: Dodd, Mead & Co., Inc., 1931. $2.00.
"Analyzes the crawl, breast and back strokes into individual units to be mastered one at a time, and combined into a smooth, coordinated stroke. The chapters on games, life-saving methods, and rules for competition are useful, while the chapter devoted to diving shows a keen appreciation of timing values." *A. L. A. Cat.*

Sheffield, L. M., and Sheffield, N. C. *Swimming Simplified.* 2d rev. and enl. ed. New York: A. S. Barnes & Co., 1927. $2.00.
An excellent textbook for the beginner to follow.

Shephard, D. A. C. *Water Polo.* London: Chapman & Hall, Ltd., 1930. 2s6d.

Smith, A. A. *Swimming and Plain Diving.* New York: Chas. Scribner's Sons, 1930. $2.00.
"This book has been written for use as a teachers' manual, as a textbook for classes, or as a practical guide for those who can swim but who have learned incorrect habits." *Author's preface.*

Weissmuller, John, and Bush, C. A. *Swimming the American Crawl.* Boston: Houghton Mifflin Co., 1930. $2.50.
Cheaper edition, 1933. Published by Putnam, 3s6d.
Weissmuller is generally considered to be the greatest all-round swimmer of the world. At one time or another he has held all of the free-style records up to the mile. He gives instruction for the beginner as well as details for the experienced racer.

ROWING

Crew races in America are now followed by thousands, both in colleges and out. The Poughkeepsie Regatta, won by California in 1934, is the high spot for the college crews while the Henley championships mark the peak for the amateur rowers. Rowing in general is confined to colleges and clubs, the sport being rather expensive for individuals to have shells. The American literature on the subject is rather brief although the English press has produced more than a dozen books. Included here are only those that seem to be the best and most recently published by the American press.

Bancroft, J. H., and Pulvermacher, W. D. *Rowing Races* (in their *Handbook of Athletic Games,* p. 599–614. 1916, New York: Macmillan Co. $2.00).
The material covered deals more with regattas and course lengths than with rowing itself. The spectator can profit more from this brief account than the athlete.

Camp, W. C. ed. *Rowing* (in his *Book of Sports and Games,* p. 41–60. 1923, New York: T. Y. Crowell Co. $2.00).
Brief history, how to row and terms are given. Instructional to both the beginner and to those who observe races.

Coventry, W. B. *The Mechanics of Rowing.* New York: Macmillan Co., 1928. $1.75.

GLENDON, R. A., and GLENDON, R. J. *Rowing.* Philadelphia: J. B. Lippincott & Co., 1923. $2.00.

A general survey of rowing by two well-known coaches. The 1920 Olympic races are treated at length and records at the United States Naval Academy are covered. Has a folded page of miscellaneous records which is tipped in.

KELLEY, R. F. *American Rowing.* New York: G. P. Putnam's Sons, 1932. $3.75.

A complete history of rowing in America. The appendices give full records of all the leading American rowing events. More general than Glendon.

ICE SPORTS

Part one contains under this head curling and ice hockey. All other ice and winter sports, not being games, are in part two under the general head "Winter Sports."

CURLING

This ancient Scottish pastime has received almost no attention from Americans. There has been a movement, though not particularly strong as yet, to establish the game in this country on a firmer basis. In the northern states curling clubs are appearing, composed largely of older folk, most of whom have Scottish blood, and interclub matches are played. Canadian curling has been more pronounced, several strong organizations existing with a history dating back nearly one hundred years. Libraries in the northern states should try to get one or two books on the game, but those farther south will find no demand. There are no recent American books on the subject. At the III Winter Olympic Games, curling was an exhibition contest. In the *Official Report* there is a brief history of the game and its appeal. The two older books listed here are scholarly treatises and have much more than a mere account of the game's history.

DIER, J. C. ed. *Curling* (in his *Book of Winter Sports,* p. 125–164. 1912, New York: Macmillan Co. $1.50).

Several short articles by different persons and including one on the rules as they were at that time.

KERR, JOHN. *History of Curling.* Edinburgh, Scotland: David Douglas, 1890. 0. p.

A literary treatment of the game. Many quotations are included, much of the game's history, and the terms that are used. Bibliography of earlier printed matter on curling is interesting to any curling enthusiast.

MOBBS, A. N., and MCDERMOTT, F. *Curling in Switzerland.* London: J. W. Arrowsmith, Ltd., 1929. 10s6d.

"A treatise on the principles of the game, and where and how to play it, with 102 photographs and 34 diagrams." *Title page.*

TAYLOR, JAMES. *Curling: the Ancient Scottish Game.* Edinburgh, Scotland: W. Patterson, 1884. 0. p.

Similar to Kerr's book. Has a great deal of history, something of clubs and tournaments, and songs and anecdotes. The Royal Caledonian Curling Club is fully discussed.

WHITE, W. D. *Putting Curling in the Curriculum* (in his *Book of Winter Sports*, p. 107–116. 1925, Boston: Houghton Mifflin Co. $3.00).
Brief chapter telling a bit about the game and its history and appeal. Diagram.

ICE HOCKEY

Professional, amateur, and intercollegiate ice hockey have had a rapid rise during the last ten years. The Stanley Cup matches, for the world's professional championships, draw crowds of close to twenty thousand spectators; many colleges report turning people away because of no seats. Because of its very nature the game is confined to the northern section of the United States and to Canada. The increased use of artificial rinks will result in a spread to the south. Thus, while it is only in a few northern state libraries that there is a present need for books, the others should watch the game's development and spread and be ready. There is very little in print, there being but two complete books, both good, covering ice hockey. The game is generally referred to as hockey and must not be confused with field hockey which is entirely different.

BANCROFT, J. H., and PULVERMACHER, W. D. *Ice Hockey* (in their *Handbook of Athletic Games*, p. 285–312. 1916, New York: Macmillan Co., $2.00).
History, play, glossary of terms, equipment, rules, and officials are given mention.

BARBOUR, R. H. *Ice Hockey* (in his *Book of School and College Sports*, p. 353–390. 1904, New York: D. Appleton & Co. o. p.).
Brief historical account, with comments on playing the game, a few records, and the rules of the day. Now out of date.

CAMP, W. C. ed. *Ice Hockey* (in his *Book of Sports and Games*, p. 263–281. 1923, New York: T. Y. Crowell Co. $2.00).
Principles of the game. The diagram gives the old terms to positions and is out of date as the game is now played with six rather than seven players.

CAULKINS, E. D. ed. *Ice Hockey* (in his *Intimate Talks by Great Coaches*, p. 193–242. 1930, New York: Wingate Memorial Fund, $2.00).
Development of ice hockey, rules, and the coaching of school teams.

FISHER, T. K. *Ice Hockey; a Manual for Player and Coach*. New York: Chas. Scribner's Sons, 1926. $1.75.
"A good exposition of the game in all its phases, plays, equipment of players, and rules of the game. By a well-known coach." *Booklist*.

SAYLES, ALEXANDER, and HALLOCK, GERRARD. *Ice Hockey*. New York: A. S. Barnes & Co., 1931. $2.00.
"This brief but fairly comprehensive manual gives the origin of the game, its offensive and defensive tactics, suggestions for play improvement, interpretation of the amateur rules, and a glossary of terms." *Booklist*.

SELF-DEFENSE

The arts of self-defense, while not games, are put in this grouping rather than in part two. To put them with the latter class is misleading, and as most of them are sports which have intercollegiate standing it seems best to place them with the other sports of this type. Two of them

are more or less of foreign nature but are included because there are American books about them.

BOXING

This is easily the most popular of the arts of self-defense. The sport reached its peak with the second Dempsey-Tunney match when more than one hundred thousand people paid to see the fight. Many books are in print and they seem to fall into the three groupings which have been made. Libraries should have a well-rounded collection in this field as boys and men are eager to read about the sport. The newspapers are full of news of current matches and there are several periodicals dealing with boxers and boxing, the most important of these being *The Ring*.

Historical

FARNOL, JEFFERY. *Famous Prize Fights.* Boston: Little, Brown & Co., 1928. $3.00.

"Here are described some of the most famous prize-fights of history, from the gladiators of Rome to Carpentier vs. Dempsey. The sketches recall the methods and personalities of the fighters, many of them forgotten champions of the past." *Book Review Digest.* There are several better books than this.

INGLIS, WILLIAM. *Champions Off Guard.* New York: Vanguard Press, 1932. $3.00.

"Great ring battles and personalities from Sullivan to Tunney." *Doris Hoit.*

JOHNSTON, ALEXANDER. *Ten—and Out!* New York: Ives Washburn, Inc., 1927. $3.50.

Foreword by Gene Tunney.

"A complete story of the prize ring in America from 1816, which was one hundred years after the birth of the sport in England, to the present day. The narrative ends on the eve of the second fight between Jack Dempsey and Gene Tunney." *Springfield Republican.*

LYNCH, J. G. B. *Knuckles and Gloves.* New York: Henry Holt & Co., Inc., 1923. $3.50.

A history of the ring, telling of the famous fights from 1738 to 1922. A useful reference book on the subject but not as complete as S. T. Wignall's.

WIGNALL, S. T. *The Story of Boxing.* New York: Brentano's, 1924. $6.00.

While largely a history of English and Continental boxing, it is of interest to Americans because of the international aspects of the sport. There is a chapter or two on American fighting and appendices with rules of the game. A more complete treatment and a better book than Lynch.

WIGNALL, T. C. *The Sweet Science.* New York: Duffield & Co., 1926. $3.50.

"He does full justice to most of the good boxers he has met as friends and seen in action and in the main, the illustrations in his book do likewise." *Times (London) Literary Supplement.*

Biographical

CORBETT, J. J. *The Roar of the Crowd.* New York: G. P. Putnam's Sons, 1925. $2.50.

The informal record of his own brilliant ring career, full of interest to the boxing enthusiast. His observations on technique and the psychology of boxing are worth while and add to the book. Illustrated with photographs.

DIBBLE, R. F. *John L. Sullivan.* Boston: Little, Brown & Co., 1925. $3.00.
The intimate life of the former champion and idol of the crowds.

EAGAN, EDDIE. *Fighting for Fun.* New York: Macmillan Co., 1932. $2.50.
"This is one of the best books about boxing we have come across for a long time. Eagan, as all the 'fans' will know, was the amateur heavy-weight champion of the world, and this autobiography of his proves that he can write almost as well as he used to be able to fight." *Saturday Review.*

PRESTON, H. J. *Memories.* New York: Sears Pub. Co., Inc., 1928. $3.00.
An Englishman, who has been a boxer of note, gives to the public the events of his life. The chapters concerning American boxing are particularly interesting as coming from an Englishman they present a different viewpoint.

TUNNEY, GENE. *A Man Must Fight.* Boston: Houghton Mifflin Co., 1932. $2.50.
"The personal narrative of the author's career as a prize-fighter, written without the assistance of a ghost-writer, describes the strategy of his various ring battles and attempts to convey an idea of the emotional reactions of a man in the ring." *Book Review Digest.*

VAN EVERY, EDWARD. *Muldoon, the Solid Man of Sport.* New York: F. A. Stokes Co., 1929. $3.00.
Foreword by Jack Dempsey.
William Muldoon, "father of American boxing," a champion wrestler, and trainer of John L. Sullivan, was at all times a champion of clean living.

How to Box

CARPPENTIER, GEORGES. *Art of Boxing.* New York: Doubleday, Doran & Co., Inc., 1926. $1.50.
"The French champion looks back over the route he traveled and points out the features along the way. The carefully posed illustrations illustrate his methods of defense and attack." *Book Review Digest.*

JACOMB, W. J. *Boxing for Beginners.* Philadelphia: Lea & Febiger, 1918. $1.25.
". . . with a chapter showing its relationship to bayonet fighting." *Title page.*
A practical book for the novice. Photographs and notes.

KENNEDY, C. E. *Boxing Simplified.* 2d ed. Yellow Springs, Ohio: Antioch Press, 1929. $2.00.
The author is head of the Physical Education Department at Antioch College. Written especially for teachers, it is simple and instructive.

KNEBWORTH, E. A. J. L., and others. *Boxing* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1931. $6.00.
This is more than just a history of the game, it "combines a history of boxing and prize fighting in England and America with a practical guide to modern methods." *Book Review Digest.*

O'BRIEN, P. J., and BILIK, S. E. *Boxing.* New York: Chas. Scribner's Sons, 1928. $2.00.
"A book which should be appreciated by men and boys, and one which insists on the dignity of boxing as skillful, scientific sport." *Wisconsin Bulletin.*

BULL FIGHTING

While this pastime is mainly foreign, particularly Spanish and Mexican, there is sufficient interest on the part of Americans to warrant its inclusion. One of the great matadors of the present day is an American,

Sidney Franklin. The two titles listed are more or less biographical in nature, but are among the few written in the English language. There is a recent Spanish bibliography dealing with the sport which covers more than four hundred pages, excellent indication of its tremendous following in that country.

BAERLEIN, H. P. B. *Belmonte, the Matador.* New York: H. Smith & R. Haas, 1934. $3.50.

The life of a matador, considered by many to be the greatest matador, told with sympathy and understanding. The technical descriptions are not as well done as in Hemingway, nevertheless the book has charm and readability in its rambling manner.

HEMINGWAY, ERNEST. *Death in the Afternoon.* New York: Chas. Scribner's Sons, 1932. $3.50.

Popularly written and well illustrated with photographs. There is a sketch of the life of the American matador Sidney Franklin and at the end there is a good glossary.

FENCING

Fencing, one of the oldest of all sports, is widely practiced in European countries, especially where duelling is allowed, and is now becoming Americanized. As yet most of the leading American fencers are of foreign extraction, but the time will not be long when there will be stars of native birth. The War, with its close-in fighting, made the worth of the art apparent, for he who could not parry a bayonet thrust was lost. There are several books available for instruction on the sport or for a history of its development. Those noted are the latest and most up-to-date.

BARBASETTI, LUIGI. *The Art of the Foil.* New York: E. P. Dutton & Co., 1932. $5.00.

There is a short history of fencing at the end. "Both the theory and technique of fencing are presented here by an experienced European fencer and teacher. Illustrated with line drawings and reproductions of old pictures. Glossary but no index." *Booklist.*

CASS, E. B. *The Book of Fencing.* Boston: Lothrop, Lee & Shepard Co., 1930. $5.00.

This is an earnest endeavor to stimulate the interest in this ancient sport, written by a well-known fencer, one of a family of artists in this sport.

CASTELLO, J. M. *The Theory and Practice of Fencing.* New York: Chas. Scribner's Sons, 1933. $2.50.

A comprehensive, thoroughly up-to-date book on the subject. The author is coach of the New York University team, winners of the American Intercollegiate Fencing Championships for 1933, and also coached the American Olympic fencing team of 1924. Well illustrated. Rules in the back. Probably the best, and at a reasonable price.

JOHNSTONE, JOHN. *Fencing.* Ann Arbor, Mich.: Edwards Bros., 1932. $2.00.

Mr. Johnstone is fencing coach at the University of Michigan and received most of his training in England where he was one of the leading exponents of the sport.

His book is well illustrated with diagrams and photographs, covers the subject well, but lacks both index and table of contents which makes it difficult to use.

JIU-JITSU

A Japanese sport, which in recent years has been imported to America for use among police officers as a means of self-defense. It is more effective than either boxing or wrestling and a skilled person can easily subdue a much larger opponent. There is not much available on the subject and many of the books touch on boxing or wrestling as well; similarly with books on boxing and wrestling.

FAIRBAIRN, W. E. *Scientific Self-Defense.* New York: D. Appleton & Co., 1931. $3.50.

"Mr. Fairbairn, Superintendent of the Shanghai Municipal Police, has made a special study of methods of self-defense, including Japanese jiu-jitsu and Chinese 'boxing,' and this work on his system, akin to but not identical with those methods, is the official textbook of his force." *Times (London) Literary Supplement.*

GARRUD, W. H. *The Complete Jujitsuan.* 4th ed. London: Methuen & Co., Ltd., 1929.

1st edition 1914.

A photographic study of the art with comments by the author. The last chapter compares jiu-jitsu and boxing.

HANCOCK, H. I., and HIGASHI, KATSUKUMA. *Complete Kano Jiu-Jitsu.* New York: G. P. Putnam's Sons, 1925. $5.00.

1st edition 1905.

A description and interpretation of the Kano system, used by the Japanese government exclusively in training their army, navy, and police. Hancock has done a considerable amount of writing on this subject but most of his works are old. The best of these is his *Jiu-Jitsu Combat Tricks* (1904, Putnam, $1.25.) which tells of the various methods of attack and defense as used by the Japanese.

WRESTLING

Amateur wrestling reaches its peak with the A.A.U. championships and the Olympic matches; professional wrestling is a racket. There is plenty of pamphlet material on this subject, but the number of books is rather small. The attempt here is to present a few of the latter which will be useful to those desiring a history of the sport or who wish to study holds and strategy.

LIEDERMAN, E. E. *Science of Wrestling and the Art of Jiu-Jitsu.* New York: Pub. by the author, 1924. $3.00.

The two methods of defense are discussed and compared. Will assist in perfecting your ability.

MEYERS, J. C. *Wrestling from Antiquity to Date.* St. Louis: Pub. by the author, 1931. $3.00.

Covers the history of wrestling very well.

OTOPALIK, HUGO. *Modern Wrestling for the High School and the College* (Scribner's Athletic Library). New York: Chas. Scribner's Sons, 1930. $2.00.

An excellent book for the amateur wrestler. Takes up the various holds and the problem of conditioning yourself for combat.

PREHN, PAUL. *Scientific Wrestling.* Champaign, Ill.: Bailey & Himes, 1925. $3.00.

A successful college coach takes up the subject as a science. His book is useful to coach and wrestler.

MINOR SPORTS

BILLIARDS AND POOL

Really games of skill more than of physical exercise, they are included here because of their widespread interest. The two games are closely allied and books which cover one usually cover the other, although most of the literature is on billiards. The two best books are Daly and Hoppe. The English press has several titles, but, with two exceptions, they are not included.

DALY, MAURICE. *Billiard Book.* New rev. ed. Chicago: A. C. McClurg & Co., 1923. $2.50.

Edited by W. W. Harris.

An excellent piece of work by a former world's champion and including more than four hundred carefully drawn diagrams explaining simple and difficult shots. Position play is stressed throughout.

GARNIER, A. *Scientific Billiards.* New York: D. Appleton & Co., 1880. 0. p.

One of the earliest of the good books on billiards. It consists of illustrations and explanations on how to perform all kinds of shots. Billiards, like tennis, is a matter of spin, and as the laws of spin do not vary this is still a fine guide to players.

HOPPE, WILLIE. *Thirty Years of Billiards.* New York: G. P. Putnam's Sons, 1925. $2.50.

Edited by T. E. Crozier.

This is one of the best on the game and is by one of the game's masters. Mr. Hoppe's whole life has been centered around this sport and he tells of his own career as well as how to play the most difficult shot.

NEWMAN, TOM. *How to Play Billiards.* London: Methuen & Co., Ltd., 1923. 8s6d.

Illustrated. Mr. Newman has written several other books concerning billiards and is a well-known English authority.

Practice Strokes at Billiards. 4th ed. London: C. A. Pearson, Ltd., 1919. 1s6d.

The book is made up of diagrams and explanatory text.

BOWLING

Bowling has one of the largest followings of any of the more or less individual games. The national tournament, American Bowling Congress, is one of the most spectacular of all sporting events and lasts for several weeks while teams and individuals from all parts of the United States compete. There is a lamentable lack of material in book form. Almost all of the good writing on this subject is confined to the *Spalding Athletic Library.* The American Bowling Congress also publishes reports and pamphlets. Libraries from the medium-size group up should have the Spalding pamphlets.

CAMP, W. C. ed. *Bowling* (in his *Book of Sports and Games,* p. 143–161. 1923, New York: T. Y. Crowell Co. $2.00).

A list of "don'ts" and a summary of rules will be useful. Diagram.

CROQUET

An old lawn game, long fashionable among the older generations, croquet had somewhat of a revival several years back. The game requires skill rather than strength and for this reason probably does not attract young people. In England the game has been followed more closely than in America and several very good books are in print. The American press, except for the *Spalding Athletic Library*, has practically nothing in the twentieth century. One or two English books are entered here with no annotation, being included as recent books on the subject.

CAMP, W. C. ed. *Croquet* (in his *Book of Sports and Games*, p. 209–220. 1923, New York: T. Y. Crowell Co. $2.00).

History, implements, how to play the game, and terms used are included. Diagram.

CROQUET ASSOCIATION. *Handbook of Modern Croquet*. New York: Longmans, Green & Co., 1931. $.75. Pam.

CROWTHER-SMITH, H. F. *Art of Croquet*. London: H. F. & G. Witherby, 1932. 10s6d.

FELLOW, R. *The Game of Croquet*. New York: Hurd & Houghton, 1865. o. p.

An old handbook, telling of the game as played at that time and listing several variations, one of which is now the best known form.

LILLIE, ARTHUR. ed. *Croquet up to Date*. New York: Longmans, Green & Co., 1900. $3.50.

An old book by a master of the game. After covering its history, Mr. Lillie outlines and diagrams many shots making it still a useful book and one of interest to followers of the game.

WHITAKER, EDGAR. *Modern Croquet* (Recreation Books). London: Frederick Warne & Co., 1929. 6d.

GYMNASTICS

In the sense used in this bibliography, gymnastics is meant to be the competitive stunts on trapeze, rings, bars, and the like. It does not include gymnastics in the sense of organized physical drill as in a gym class. Within the last three years there have been three or four worth-while contributions in this field.

COTTERAL, BONNIE, and COTTERAL, DONNIE. *Tumbling, Pyramid Building and Stunts for Girls and Women* (Athletics for Women). New York: A. S. Barnes & Co., 1926. $1.60.

Gymnastics for women is adequately covered for the gymnasium teacher. There is an index of stunts arranged under individual, couple or group, dependent on the number to which they are suited.

CRAMLET, THEODORE, and HINOTE, R. C. *Physical Education Activities*. New York: Dodd, Mead & Co., Inc., 1932. $2.00.

Preface is by J. C. Elsom of the University of Wisconsin.

Part one deals with gymnastics and tumbling, taken up by subject; part two deals with the organization of gymnastic work. Bibliography and index. The former is not accurate in all cases.

HARBY, S. F. *Tumbling*. Philadelphia: W. B. Saunders Co., 1932. $2.00.

Foreword by J. F. Williams.

Takes it forward from the time one begins the work until he becomes an

expert. Both individual and companion work is described. Line drawings are good and add to the book's usefulness for teachers and athletes. Bibliography and index.

McCLOW, L. L. *Tumbling Illustrated.* New York: A. S. Barnes & Co., 1931. $3.00.

A good book for the high school library. The line drawings are excellent for study purposes.

McCULLOCH, J. H. *Gymnastics, Tumbling, and Pyramids.* Philadelphia: W. B. Saunders Co., 1934. $2.00.

The most recent book on the subject and one which has excellent diagrams for student, coach, or teacher. The author is director of the Physical Education Department at Michigan State Normal College, Ypsilanti.

HANDBALL

For material on this game, played in an enclosed room using all six walls, the best place to go is the *Spalding Athletic Library.* There are no books on the subject.

BANCROFT, J. H., and PULVERMACHER, W. D. *Handball* (in their *Handbook of Athletic Games,* p. 273–283. 1916, New York: Macmillan Co. $2.00).

A very brief outline of the rules, history, play, and terms of the game. It is the American game of what the English call "Fives."

HORSESHOE PITCHING

Quoits and the name "barnyard golf" are thought of almost as soon as one says horseshoes. This quiet game has its following and requires much skill. There is a national organization and championships are held regularly. Aside from the usual rulebook and pamphlets issued by Spalding there is not much. The chapter in Post and Shirley, *Selected Recreational Sports for Girls and Women,* pages 27 to 34, has a bibliography at the end which may be useful. Full entry for this book is on page 84.

SHUFFLEBOARD

This is a sport which has quite a following among girls and in school use. On board ship it will always be popular. There are no books which deal with it exclusively, but the two chapters noted below deal with it in two different phases and will be adequate for the average library needs.

FEDDERSEN, M. H. *Shuffleboard* (in his *Deck Sports,* p. 18–21. 1933, Boston: Hale, Cushman & Flint, Inc., $1.00).

A brief synopsis of the game and how to play it. There is one diagram and one photograph.

POST, J. H., and SHIRLEY, M. J. *Shuffleboard* (in their *Selected Recreational Sports for Girls and Women,* p. 66–78. 1933, New York: A. S. Barnes & Co. $2.00).

This chapter has some very good diagrams which are helpful to those learning the game.

LAWN BOWLS

Lawn bowls must not be confused with the indoor game bowling which is entirely different in its play. This is one of the older games, one

which is popular in England more than in America and a game liked by middle-aged men in particular. The few titles listed are mostly English and indicate its popularity in that country.

CAMP, W. C. ed. *Lawn Bowls* (in his *Book of Sports and Games*, p. 291–306. 1923, New York: T. Y. Crowell Co. $2.00).

Covers the rules of play, terms, and has a diagram.

KELLEY, J. *Bowls*. London: John Long, Ltd., 1933. 1s.

LINNEY, E. J. *History of the Game of Bowls*. London: T. Werner Laurie, Ltd., 1933. 10s6d.

MANSON, J. A. *Bowling; Being the Practice of the Ancient and Royal Game of Bowls*. New York: Macmillan Co., 1923. $.75.

Manson discusses the game and its history and makes the book one of the really good ones on it. He has written several others; one of the best, although somewhat older, is *The Complete Bowler* (1912, London, Black, $2.40) which has suggestions for practice as well as the historical sections.

WEBBER, H. P., and FISHER, J. W. *Modern Technique of Bowls*. New York: Pitman Pub. Corp., 1932. $2.25.

TABLE TENNIS

Another name for this game is ping-pong and by this it was long known. Recently it was officially decreed that the name table tennis was to be used. The sport has risen very rapidly and in almost every city or village there are players of the game and tournaments. There are not many books covering the game, but what there are are recent and up to the minute.

CLARK, COLEMAN. *Modern Ping-Pong, and How to Play It*. New York: John Day Co., Inc., 1933. $1.00.

This is the best book on the game, written by the leading player in the country. The book contains rules and the 1932 and 1933 rankings.

FEDDERSEN, M. H. *Table Tennis* (in his *Deck Sports*, p. 47–55. 1933, Boston: Hale, Cushman & Flint, Inc., $1.00).

Table tennis is ideal for a deck game and Mr. Feddersen describes the game and how it is played well. International rules for singles and doubles are given.

PARKER, ARNOLD. *Ping-Pong*. New York: G. P. Putnam's Sons, 1902. 0. p.

A thorough treatise of the game by an English player of note. The diagrams are good and the descriptive passages excellent. Helpful to players more than to spectators.

POST, J. H., and SHIRLEY, M. J. *Table Tennis* (in their *Selected Recreational Sports for Girls and Women*, p. 50–63. 1933, New York: A. S. Barnes & Co. $2.00).

Written particularly for women players and teachers of the game. Grips and strategy are stressed.

SCHAAD, C. G. *Ping-Pong*. Boston: Houghton Mifflin Co., 1930. $1.00.

A small handbook treating of the history and development of the game; strokes and science of play; laws; and equipment. Two international tennis stars, William T. Tilden, 2d and Francis T. Hunter have written the introductory comment.

WAITE, ARTHUR. *Table Tennis*. London: Link House, 1934. 1s.

The newest book on the game.

VOLLEYBALL

There are two good books on volleyball; one is for men, the other for women. Both are thorough and up to date. The game itself is generally played indoors although playgrounds frequently have an outside court for summer use. It is a game which involves practically all of the body muscles and one which requires constant practice to become skilled. The book by Laveaga is more complete than Montgomery and will be better suited to library use.

BANCROFT, J. H., and PULVERMACHER, W. D. *Volley Ball* (in their *Handbook of Athletic Games*, p. 461–470. 1916, New York: Macmillan Co. $2.00).

Outline of the game, how it is played, scoring, and summary of the rules. The latter is now out of date.

LAVEAGA, R. E. *Volleyball, a Man's Game*. New York: A. S. Barnes & Co., 1933. $2.00.

History, play, and court are discussed simply and completely. This is the best book on the game.

MONTGOMERY, K. W. *Volleyball for Women*. New York: A. S. Barnes & Co., 1928. $1.60.

Similar to Laveaga but adapted for women and not as technical. An appendix gives the Florida state volleyball rules for women.

PART II

GUIDE TO OUTDOOR RECREATIONS

HUNTING AND FISHING

It is hardly necessary to mention the vast quantity of literature which is available for these two widely followed recreations. There is unlimited material; every library, large or small, has a goodly supply. Those books which are given here are but a representative list, not necessarily the best, but rather titles covering all phases of these sports. The subheads used indicate something of the scope treated. Many of the books cover more than just hunting and fishing; other sports overlap. This is especially true of archery, shooting, and trapping. Numerous books cover more than one phase of the sport; the entry is under the head which seems to be most appropriate to the main emphasis of the volume. It has seemed advisable to include a subhead on conservation of wild life and include here a few titles, mostly of the more popular type, which encourage humane methods by sportsmen. Periodical material, like book material, is extremely prolific; there are many devoted exclusively to these pastimes. The leading ones are included in a periodical list as an appendix at the end of the bibliography.

Ackerman's Sportsman's Guide. Cleveland: Pub. by the author. $.50. Pam.

Revised annually.

An unusual publication giving information about fishing and hunting districts in all parts of the United States and Canada, as well as a few places on other continents. A summary of fish and game laws is included.

American Sportsman's Library. 6 v. New York: Macmillan Co., 1924. $1.75 each.

Edited by Casper Whitney.

Consists of old works issued in a new edition. Contents: Graham, *The Sporting Dog*; Holder, *The Big Game Fishes of the United States*; Roosevelt and others, *The Deer Family*; Sage and others, *Salmon and Trout*; Sandys and Van Dyke, *Upland Game Birds*; Sanford and others, *The Water-Fowl Family*.

McGUIRE, HARRY. comp. *Tales of Rod and Gun*. New York: Macmillan Co., 1931. $2.50.

The compiler, in 1931, was editor of *Outdoor Life*.

"A collection of the best American hunting and fishing stories." *Title page*.

Includes articles by Rex Beach, Archibald Rutledge, Zane Grey, Donald Hough, VanCampen Heilner, Stewart Edward White, Richard Halliburton, and others. Most of them have appeared in periodicals and many are included in other books as well.

MOORE, P. H. *With Gun and Rod in Canada*. Boston: Houghton Mifflin Co., 1922. $4.00.

A practical book, full of anecdotes, concerning hunting and fishing in Canada. Culled from his own wide experiences, the remarks Mr. Moore offers are valuable.

PARKER, ERIC. *Anthology of Sporting Prose and Verse* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1932. $4.00.

One of the best of this type.

PHILLIPS, J. C. *Sportsman's Scrapbook*. Boston: Houghton Mifflin Co., 1928. $5.00.

Illustrated by A. L. Ripley.

"For the lover of the out-of-doors and particularly for the hunter, here are stories of a sportsman's luck in field, forest and stream. . . . ." *Book Review Digest*.

CONSERVATION

BORDEN, C. L. *Adventures in a Man's World*. New York: Macmillan Co., 1933. $2.00.

A woman sportsman goes fishing and hunting. Her emphasis is on conservation of wild life. A true sportswoman, her experiences in northern Michigan, Oregon, Alaska, and Siberia are of particular interest to women.

GRINNELL, G. B., and SHELDON, CHARLES. eds. *Hunting and Conservation*. New Haven, Conn.: Yale Univ. Press, 1925. $5.00.

Boone and Crockett Club papers on game conservation and preservation.

HEWITT, C. G. *The Conservation of the Wild Life of Canada*. New York: Chas. Scribner's Sons, 1921. $2.50.

"A discussion of the preservation of the larger wild mammals and birds of Canada, by the man who as Dominion Entomologist and Dominion Consulting Zoologist was largely responsible for the revision of the game laws of the northwest territories. The reading of the book is like a trip to the north woods, but with a scientist as a companion, rather than a record-breaking hunter of big game." *Condensed from American Naturalist*, 1922.

HORNADAY, W. T. *Our Vanishing Wild Life*. New York: Chas. Scribner's Sons, 1913. $1.50.

A plea for the safeguarding of wild life by fishers, hunters, campers, and trappers. The true sportsman should and will heed these words.

HORNADAY, W. T. *Thirty Years' War of Wild Life.* New York: Chas. Scribner's Sons, 1931. $2.50.

Mr. Hornaday is Director Emeritus of the New York Zoological Park and has long been a leader in game and bird conservation. Every sporting hunter, and it should include all, should read this book; then think of your past record and reform.

RHEAD, LOUIS. *Fisherman's Lures and Game-Fish Food.* New ed. New York: Chas. Scribner's Sons, 1926. $2.00.

An earlier edition was published in 1920 for $4.00.

The desire is to encourage the use of lures rather than live bait and to aid in maintaining and increasing the stock by better feeding. The casual unsporting fisherman will have no time for this; the thinking sportsman will read it.

HUNTING

Under this head and its subdivisions are entered books dealing with all phases of this sport. While some of them probably could go with other sports as well, they are included here because their main emphasis is with hunting. The followers of the sport number in the millions; more than 6,000,000 were licensed in 1928–29. A few books dealing with hunting dogs of various kinds and their training are included in one of the subdivisions.

General

BEACH, REX. *Oh! Shoot!* New York: Harper & Bros., 1921. $3.00.

"Confessions of an agitated sportsman." *Subtitle.*

There is also a $1.00 edition published by the Garden City Publishing Company.

Humorous notes on hunting experiences by a popular modern writer.

CURTIS, P. A. *American Game Shooting.* New York: E. P. Dutton & Co., 1927. $4.00.

The author has been shooting editor of *Field and Stream* since 1919. He discusses game of all kinds, large or small, birds or beasts. Easy to read.

ENDICOTT, WENDELL. *Adventures in Alaska and Along the Trail.* New York: F. A. Stokes Co., 1928. $5.00.

Hunting and camping in Alaska together with some of his experiences in other parts of North America. Illustrated.

PARKER, ERIC. ed. *Shooting by Moor, Field and Shore* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1929. $7.00.

Well written articles by several authorities on all phases of game hunting.

ROBINSON, B. W. *With Shotgun and Rifle in North American Game Fields.* New York: D. Appleton & Co., 1925. $3.50.

Part I deals with small game and game birds; part II covers big game hunting in the north and west.

ROOSEVELT, KERMIT. *The Happy Hunting-Grounds.* New York: Chas. Scribner's Sons, 1920. $1.75.

Hunting in many parts of the world as told from his own experiences and those of his father. Good reading. The book is interspersed throughout with characteristics of his famous father.

Game Birds, Fowl, and Small Game

ASKINS, CHARLES. *Game Bird Shooting.* New York: Macmillan Co., 1931. $4.00.

Edited by Edward Cave.

BRUETTE, W. A. *American Duck, Goose, and Brant Shooting.* New York: G. Howard Watt, 1929. $7.50.

Dr. Bruette gives a scientific treatise which every gunner should read. Covers not only technique but also the birds and their habits. Well illustrated.

NEWSOM, W. M. *Whitetailed Deer.* New York: Chas. Scribner's Sons, 1926. $3.00.

A study of the Virginia or whitetailed deer, with many practical hints. Hunters reading this will wound less and kill more deer. Illustrated with photo-engravings and drawings.

RUTLEDGE, ARCHIBALD. *Plantation Game Trails.* Boston: Houghton Mifflin Co., 1921. $3.50.

Hunting in the woods, along streams, in marshes, and on lakes in the South for game of all kinds, mostly small. Of particular interest to the southern hunter.

THOMPSON, J. B. DE M. *Sport in Field and Forest.* New York: D. Appleton & Co., 1926. $2.00.

Also known to his readers as Ozark Ripley, Mr. Thompson covers small game hunting in various parts of the United States. He includes hints on hunting, guns, and ammunition. Illustrated.

Fox Hunting

FREDERICK, C. E. ST. J. and others. *Fox Hunting* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1930. $7.50.

An excellent work on this popular sport, with chief emphasis on English hunts.

REEVE, J. S. *Fox Hunting Recollections.* Philadelphia: J. B. Lippincott & Co., 1928. $5.00.

Introduction by Henry G. Vaughan.

Recollections of various hunts from 1922 to 1928 arranged chronologically. For the most part they took place in eastern United States, many as a part of the Radnor Hunt Club.

WILLOUGHBY DE BROKE, R. G. V. *Hunting the Fox.* New York: Chas. Scribner's Sons, 1925. $5.00.

Illustrated by Lionel Edwards.

Deals with fox hunting as followed in England.

Hunting Dogs

BECKFORD, PETER. *Thoughts on Hunting.* New York: Alfred A. Knopf, 1926. $3.50.

Introduction and notes by J. O. Paget.

"First published in 1781, these letters by a Dorsetshire squire on hunting with hounds remain a standard work on the subject." *Pittsburgh.*

MILLER, W. H. *The American Hunting Dog.* New York: D. Appleton & Co., 1926. $2.50.

"Information on selection, breeding, and training. The author was formerly editor of *Field and Stream.*" *Pittsburgh.*

SMITH, A. C. ed. *Hounds and Dogs* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1932. $5.00.

A scholarly work treating with dogs of all kinds, their relation and use in hunting and field sports.

WHITFORD, C. B. *Training the Bird Dog.* New ed. rev. New York: Macmillan Co., 1928. $2.00.

Revised and amended by Edward Cave.

The training of the bird dog takes patience and care; the well-trained dog is worth the time and effort.

Big Game—North America

GREY, ZANE. *Roping Lions in the Grand Canyon.* New York: Harper & Bros., 1924. $1.75.

1926 reprint published by Grosset for $.75.

A true story of his own experiences. Roping lions is a far more dangerous sport than shooting them. His tale is thrilling and well written.

MCGUIRE, J. A. *In the Alaska-Yukon Game Lands.* New York: D. Appleton & Co., 1921. $2.50.

"An account of the adventures of a party of hunters headed by the author, on a trip to Alaska to hunt for specimens suitable for mammal groups to be placed in the Colorado Museum of Natural History at Denver." *Pittsburgh.* The introduction is by W. T. Hornaday, the well-known conservation leader.

ROOSEVELT, THEODORE. *The Works of Theodore Roosevelt.* National edition. 20 v. New York: Chas. Scribner's Sons, 1924.

The first five volumes of this edition contain his works on outdoor life and hunting. There are numerous editions of his works and many of his books have been published separately. One or two of his best known ones, while included in this edition, are also entered individually.

———. *Wilderness Hunter.* Knickerbocker ed. 2 v. in 1. New York: G. P. Putnam's Sons. $1.75.

Western United States and the great plains were the scenes of many of the former president's most interesting experiences. Numerous editions at all price ranges are available.

SHELDON, CHARLES. *Wilderness of Denali.* New York: Chas. Scribner's Sons, 1930. $6.00.

Denali is Indian for Mt. McKinley, Alaska. This is a reprint of diaries which the author kept from 1906 to 1908.

WILLIAMS, A. B. *Game Trails in British Columbia.* New York: Chas. Scribner's Sons, 1925. $5.00.

Big game hunting in British Columbia by a former head of the Provincial Game Department. Illustrated.

Big Game—Foreign

BELL, W. D. M. *The Wanderings of an Elephant Hunter.* New York: Chas. Scribner's Sons, 1923. $7.50.

Deals largely with elephant hunting with native tribesmen in Africa, but includes a chapter on buffalo and one on the African lion. Has a valuable chapter on the selection of rifles for big game hunting.

BUCK, FRANK, and ANTHONY, EDWARD. *Bring 'Em Back Alive.* New York: Simon & Schuster, 1930. $2.00.

Stories of collecting big game, told by a well-known collector and written up by Mr. Anthony. While it is good reading, there is little which the average

big game hunter will find practical. A more recent book by the same two authors, and one which has been put on the screen, is their *Wild Cargo* (1932, New York, Simon & Schuster, $3.00).

BURBRIDGE, BEN. *Gorilla.* New York: Century Co., 1928. $3.50.

Hunting big game such as gorillas, lions, elephants, buffalo, and the like in east Africa.

CHAMBERLAIN, G. A. *African Hunting Among the Thongas.* New York: Harper & Bros., 1923. $4.00.

The major part of the book deals with big game hunting in East Africa, but there is a valuable appendix which gives details for the outfitting of an expedition and the individual.

CHRISTY, CUTHBERT. *Big Game and Pygmies.* New York: Macmillan Co., 1924. $7.50.

Introductory chapter by Sir Harry H. Johnston.

This, one of the best on big game hunting that is in print, will fascinate the hunter and attract the non-hunter.

HORNADAY, W. T. *Wild Animal Round-Up.* New York: Chas. Scribner's Sons, 1925. $5.00.

Mr. Hornaday recalls his experiences hunting big game for the New York Zoological Society. The photographic illustrations are some of the best ever taken of wild animals.

JOHNSON, M. E. *Lion.* New York: G. P. Putnam's Sons, 1929. $2.50.

The well-known big game hunter relates his experiences with the king of beasts in Africa. Mr. Johnson has several others of a similar nature telling of his escapades.

MAYDON, H. C. *Big Game Shooting in Africa* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1932. $6.00.

POPE, S. T. *Adventurous Bowmen.* New York: G. P. Putnam's Sons, 1926. $2.50.

"The record of a hunting expedition in 1925 in Tanganyika Territory where the author and his party used the English longbow in shooting big game." *Pittsburgh.*

See also entry under *Archery.*

ROOSEVELT, ELLIOTT. *Hunting Big Game in the Eighties.* New York: Chas. Scribner's Sons, 1932. $3.00.

Edited by Ann Eleanor Roosevelt.

These letters of a brother of Theodore Roosevelt and the father of the editor reveal many of the hunting experiences of the Roosevelts as well as much of personal interest about their lives.

ROOSEVELT, THEODORE. *African Game Trails.* 2 v. New York: Chas. Scribner's Sons, 1924. $6.00.

The great sportsman's hunting experiences vividly retold. There are numerous editions since the first which came out in 1910.

STEWART, A. E. *Tiger and Other Game.* New York: Longmans, Green & Co., 1927. $6.00.

"As a treatise on how to kill big game in India this is as good and practical a book as can be found." *Spectator.*

WHITE, S. E. *Lions in the Path.* New York: Doubleday, Doran & Co., Inc., 1926. $3.00.

Hunting big game with the bow and arrow in Africa. The experiences as retold are vivid and thrilling to hunter and to archer. The author was with Dr. Pope on one of his expeditions.

FISHING

Like hunting, fishing is one of the most widely followed recreations in America. Long popular, the number of books, pamphlets, articles, and periodicals is large. While some phases of it seem to be gaining favor in one section, others jump ahead in popularity elsewhere. Be it sufficient to say that these entries are but a small proportion of the number and are chosen as representative of all phases of the great pastime. As in hunting, the choice of subheadings is difficult. Few books fall directly and entirely into one group; its place here indicates the chief emphasis of the book. Its close relationship to hunting is seen in the number of periodicals covering both sports.

General

BERGMAN, RAY. *Just Fishing.* Philadelphia: Penn Pub. Co., 1932. $5.00.

"For the average American fishing enthusiast with but a short holiday or a few week-ends each year at his disposal for the exercise of his hobby, Ray Bergman's book is probably the best all-round work available. . . ." ***Curtice Hitchcock*** in ***Books.***

DAY, F. P. *The Autobiography of a Fisherman.* New York: Doubleday, Doran & Co., Inc., 1927. $2.50.

Reissued 1932. Minton, $2.00.

Born the son of a staunch angler, Mr. Day came by it naturally. His life book reveals the true sportsman he was, attracts the reader, and you finish eager to get out your boots and basket. Throughout his philosophy of life shows up.

GREY, ZANE. *Tales of Fresh-Water Fishing.* New York: Harper & Bros., 1928. $6.00.

Tales gathered from his own wide experience from the Atlantic to the Pacific and from the Gulf to Canada.

HOLDEN, G. P. *Angling.* New York: D. Appleton & Co., 1931. $2.00.

"Pleasant reminiscent essays on fishing experiences, combined with papers on such practical aspects of the art as 'Fly Cast and Fly Fishing,' 'Home Dressing of Fly Lines,' and 'Best Angling Knots and Attachments.'" ***Wisconsin Bulletin.***

HULIT, LEONARD. *Fishing with a Boy.* New York: D. Appleton & Co., 1921. $2.00.

"A prize for the fisherman, be he young or old." ***M. H. B. Mussey*** in ***Nation.***

JOHNSON, F. M. *Reminiscent Tales of a Humble Angler.* New York: D. Appleton & Co., 1921. $1.50.

Introduction by Dr. James A. Henshall.

Enthusiastic stories of the author's own angling experiences.

PARKER, ERIC, and others. *Fine Angling for Coarse Fish* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1930. $7.00.

A scholarly work on general fishing. It is not a book which can be hastily read but rather one to be thought about and studied as you would a textbook.

PERRY, BLISS. *Pools and Ripples; Fishing Essays.* Boston: Little, Brown & Co., 1927. $2.00.

Three essays, also published individually, by a well-known scholar. Contents: "Fishing with a Worm," "Fishing with a Fly," and "Revisiting a River."

REITEL, CHARLES. *Let's Go Fishing.* New York: McGraw-Hill Book Co., 1931. $2.50.

Humorous sketches about fishing. There is solid sense with the wit which makes it a very useful and easy book to read.

SLOCUM, E. E. *Ye Gods and Little Fishes.* New York: Dodd, Mead & Co., Inc., 1927. $2.50.

Take it along on a trip; light but good reading, especially if you have just had a bad day with rod and reel.

VAN DYKE, HENRY. ed. *Creelful of Fishing Stories.* New York: Chas. Scribner's Sons, 1932. $2.50.

A collection of twenty-seven essays and selections covering all periods from Plutarch to the present. An excellent choice of material.

WALTON, IZAAK, and COTTON, CHARLES. *The Compleat Angler.*

The standard fishing book of literature, a classic of the sport. Many editions since the first which was published in England in 1653. Every library should have it; every fisherman should read it.

Equipment

CAMP, S. G. *Fishing Kits and Equipment.* New York: Outing Pub. Co., 1910. $1.00.

What to take when you go fishing: types of flies, rods, kits, clothes. Old but good.

CARROLL, DIXIE, pseud. *Fishing Tackle and Kits.* New York: D. Appleton & Co., 1919. $3.00.

The author's real name is Carroll Blaine Cook.

A practical and useful book for the angler, now somewhat out of date but nevertheless still very helpful.

HOLDEN, G. P. *The Idyll of the Split-Bamboo.* New York: D. Appleton & Co., 1920. $3.00.

"A carefully detailed description of the rod's building prefaced by a dissertation on the joys of angling, there being appended some information on the home cultivation of silk worm gut and suggestions on landing nets and other equipment, and for the angler's camp." *Title page.*

———. *Streamcraft; an Angling Manual.* Rev. ed. New York: D. Appleton & Co., 1927. $3.00.

A practical book, based on material first published in *Forest and Stream,* which deals with the care and selection of equipment and flies and their use.

With Bait and Fly

ASTON, G. S. *Letters to Young Fly Fishers.* Boston: Houghton Mifflin Co., 1927. $2.50.

Gives directions and instructions on all phases of angling for the youthful fisherman. Casting both dry and wet flies as well as the assembling of rod and reel are included.

CAMP, S. G. *Taking Trout with the Dry Fly.* New York: Macmillan Co., 1930. $2.00.

Practical and interesting as well as authoritative.

GREY OF FALLADON, E. G. *Fly Fishing.* Rev. and enl. ed. New York: E. P. Dutton & Co., 1930. $3.75.

First edition published in 1899.

The present edition has wood engravings by Eric Daglish and includes two additional chapters of retrospect. The technique and joys of fly fishing are brought out by this enthusiast.

ST. JOHN, LARRY. *Practical Fly Fishing* (Outing handbooks). New York: Macmillan Co., 1920. $1.00.

Fly fishing from all sides, including chapters on tackle, reels, flies, apparel, casting, strategy, and the like.

SHAW, F. G. *Science of Fly Fishing for Trout.* New York: Chas. Scribner's Sons, 1925. $6.00.

For the novice or the experienced fisherman, by an expert and one who is a lover of fly casting. Illustrations and diagrams.

SMITH, O. W. *Casting Tackle and Methods.* New York: D. Appleton & Co., 1920. $3.00.

The author was, 1920, angling editor of *Outdoor Life.* Somewhat similar to Camp's book but deals more specifically with casting.

THOMPSON, J. B. DE M. *Modern Bait and Fly Casting.* New York: D. Appleton & Co., 1928. $2.00.

Informally written, it is based on the experiences of experts, of which he is one, and covers the art of casting capably.

VOGT, W. C. *Bait-Casting.* New York: Longmans, Green & Co., 1928. $2.50.

A well-illustrated, handy volume covering one phase of angling thoroughly.

Bass Fishing

HAWES, H. B. *My Friend the Black Bass.* New York: F. A. Stokes Co., 1930. $2.00.

This is an attempt to cover the whole field of the black bass. The author is a former United States Senator from Missouri.

HENSHALL, J. A. *Book of the Black Bass.* New ed. rev. New York: D. Appleton & Co., 1923. $4.50.

An admirable piece of work covering the subject scientifically, yet popularly. Sections on life history and science; tools, tackle, and implements; angling and fly fishing, divide it for the particular interest of the reader. First published more than fifty years ago, it is the best on this phase.

JONES, S. R. *Black Bass and Bass Craft.* New York: Macmillan Co., 1924. $3.00.

A book containing much technical material, but written for the layman and including fishing technique for large and small mouths.

Trout Fishing

CONNETT, E. V. *Any Luck?* New York: Windward House, 1934. $3.50.

The introduction is by George M. L. LaBrande and the illustrations by Ralph L. Boyer.

Mr. Connett is a past president of the Anglers Club of New York and is widely known as a successful angler. In a very readable book "he has sized up as of the last twenty years 'the best that is known and thought in the world' as concerns trout fishing." *Springfield Republican.*

HEWITT, E. R. *Telling on the Trout.* New and rev. ed. New York: Chas. Scribner's Sons, 1930. $2.50.

Mr. Hewitt has had years of experience, mostly in English waters, and writes interestingly and capably.

PLUMLEY, LADD. *With the Trout Fly.* New York: F. A. Stokes Co., 1929. $2.00.

"An illustrated manual on trout fishing with the fly, written for the angler by an expert who has been for many years fishing editor of *Field and Stream.*" *Book Review Digest.*

SOUTHARD, C. Z. *Evolution of Trout and Trout Fishing in America.* New York: E. P. Dutton & Co., 1928. $10.00.

The best of its kind, very inclusive and beautifully illustrated with full-page color plates. Contains information on every aspect of trout fishing in America: types, habitat and propagation, fine art of angling, and state laws on trout fishing.

TAVERNER, ERIC. *Trout Fishing from All Angles* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1929. $7.00.

A scholarly work covering all phases of trout fishing, but with a British viewpoint mainly. There is a good general index and also a special index to the chapter "The Legal Aspect of Fishing." Bibliographies at the ends of the chapters.

Salmon Fishing

CALDERWOOD, W. L. *Salmon and Sea Trout.* New York: Longmans, Green & Co., 1930. $5.00.

Migratory fish and methods to preserve and increase their number.

SCROPE, WILLIAM. *Days and Nights of Salmon Fishing in the Tweed.* New York: D. Appleton & Co., 1922. $5.00.

Edited by H. T. Sheringham.

There have been numerous editions of this famous work which was first published in 1843.

TAVERNER, ERIC. *Salmon Fishing* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co. $7.50.

A comprehensive treatment of the subject from both the scientific and popular sides. There is a chapter on the literature of the subject. Illustrated.

Whaling and Sealing

EDWARDS, E. J., and RATTRAY, J. E. *Whale Off!* New York: F. A. Stokes Co., 1932. $3.00.

A fascinating story of shore whaling with an introduction by Roy Chapman Andrews and with special reference to American whaling.

ENGLAND, G. A. *Vikings of the Ice.* New York: Doubleday, Page & Co., 1924. $4.00.

"An account of a six weeks experience on two sealers." *Pittsburgh.*

MORLEY, F. V., and HODGSON, J. S. *Whaling North and South.* New York: Century Co., 1926. $3.00.

A history of whaling, with their own personal experiences included. Morley, younger brother of Christopher Morley, went north; Hodgson went south.

Miscellaneous

COOPER, A. E. ed. *Sea Fishing* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1934. $6.00.

Experts in every phase of the sport have contributed to make this an excellent volume full of entertaining reading and much technique. Illustrations and diagrams.

ENDICOTT, WENDELL. *Adventures with Rod and Harpoon Along the Florida Keys.* New York: F. A. Stokes Co., 1925. $4.00.

"Tells the author's experiences and gives facts and suggestions for successful fishing." *Pittsburgh.*

GREY, ZANE. *Tales of Fishing Virgin Seas.* New York: Harper & Bros., 1925. $7.50.

". . . a book which every good sportsman will want in his collection, a rare chronicle of sporting events." *Boston Transcript.*

GREY, ZANE. *Tales of Southern Rivers.* New York: Harper & Bros., 1924. $4.00.

Three tales of fishing experiences in the Gulf Stream, the Everglades, and the Mexican jungle. Zane Grey is one of the most prolific of outdoors authors as well as one of the best. An earlier book of his, which covers the same region, is his *Tales of Fishes* (1919, Harper, $4.00) which are the "stirring adventures of the author as he fished for dolphin, spear-fish, wahoo, swordfish and other large species while in the Caribbean and off the coasts of Florida, Mexico, and California." *Pittsburgh.*

GRISWOLD, F. G. *Some Fish and Some Fishing.* New York: Dodd, Mead & Co., Inc. 1921. $3.00.

"Lovers of big game fishing will enjoy Mr. Griswold's contribution to the literature of their favorite sport." *Springfield Republican.*

HEILNER, VANCAMPEN. *Adventures in Angling; a Book of Salt Water Fishing.* New York: D. Appleton & Co., 1922. $3.50.

Personal experiences with large deep-water game fish. An appendix gives the tackle and line he uses and the type of fish each is used for. This will be a valuable aid to those with less experience and knowledge of what is best.

———, and STICK, FRANK. *The Call of the Surf.* New York: Doubleday, Doran & Co., Inc., 1920. $3.00.

One of the first to be published on this phase of fishing. Good stories are retold and suggestions for tackle and equipment included.

ROBINSON, B. C. *Muskellunge Fishing.* New York: D. Appleton & Co., 1925. $2.00.

Muskellunge fishing gives to anglers in northern waters their most exciting thrills. The author reviews experiences he has had, then gives practical suggestions on methods and equipment.

SMITH, O. W. *The Book of the Pike.* New York: D. Appleton & Co., 1922. $3.00.

Deals with the various types of pike, how to troll, ice-fish, and fly fish for them, how to cook them, tackle needed and something of their life and history.

SHOOTING

This head includes books dealing with trapshooting, marksmanship, guns of all kinds, and their ammunition. Because of its very nature it is closely allied with hunting, but in this group the emphasis is on the gun, not the quarry. Probably the best material is to be found in pamphlets and articles in periodicals. The comprehensive books in this class are expensive, as well as rare. Interest in the various phases of shooting has been on the increase in recent years.

ASKINS, CHARLES. *Modern Shotguns and Loads.* Marshallton, Delaware: Small Arms Technical Pub. Co., 1929. $4.00.

". . . together with a treatise on the art of wing shooting." *Title page.*

BURRARD, G. *Modern Shotgun.* 3 v. New York: Chas. Scribner's Sons, 1931–32. $15.00.

An excellent, although somewhat expensive, set dealing with this type of gun and its use in sport. Not for the small or medium-sized library.

CURTIS, P. A. *Guns and Gunning.* Philadelphia: Penn Pub. Co., 1934. $5.00.

"With its photographs and illustrations *Guns and Gunning* is the best library handbook for the serious amateur, as well as a guidebook in good taste for the beginner. It combines accuracy with judgment, experience with reason, and it

is done neatly and convincingly." *Boston Transcript.* Has chapters on pistol shooting, shooting for women, skeet shooting, and the etiquette of the field.

DILLIN, J. G. W. *The Kentucky Rifle.* Washington, D. C.: National Rifle Association of America, 1924. $10.00.

"A study of the origin and development of a purely American type of firearm, together with accurate historical data concerning early Colonial gunsmiths, and profusely illustrated with photographic reproductions of their finest work." *Title page.* Of particular interest to those sportsmen who are fond of guns and their history.

FRAZER, W. D. *American Pistol Shooting.* New York: E. P. Dutton & Co., 1929. $5.00.

A complete, instructive book on the use of the pistol, written by an authority and thoroughly up to date. Competitive marksmanship, hunting, and defense shooting are all covered.

HIMMELWRIGHT, A. L. A. *Pistol and Revolver Shooting.* New rev. ed. New York: Macmillan Co., 1928. $4.00.

The merit of this book is indicated by the number of editions it has had. This revision brings it further up to date; making it more valuable to the reader.

LANDIS, C. S. *Field and Trap Shooting.* Wilmington, Delaware: Hercules Powder Co., 1923. Gratis.

A small booklet covering the use of the shotgun in the field and at traps. Illustrated with photographs, it includes a table of loads for various kinds of game, different forms of trap shooting, targets, and a bit concerning the major championships.

MILLER, W. H. *Rifles and Shotguns.* New ed. New York: D. Appleton & Co., 1930. $3.00.

SMITH, L. B. *Better Trapshooting.* New York: E. P. Dutton & Co., 1931. $5.00.

How to improve your shot and raise your score.

TRAPPING

Trapping is an art as well as a sport. Long used by woodsmen, explorers and voyageurs, there is a romance about it which gets under your skin. There is relatively little which deals with it as a sport. Among the entries are one or two titles which deal with it as a science and also some which are written as stories of trappers and their life.

HODGSON, R. G. *Trapping in Northern Canada.* Ottawa, Canada: Fur Trade Journal of Canada, 1925. $3.00.

The trapper should have this handy book as it covers methods of trapping as well as habits of various fur bearers.

INGSTAD, H. M. *The Land of Feast and Famine.* New York: Alfred A. Knopf, 1933. $3.50.

"Translated from the Norwegian for the first time by Eugene Gay-Tifft." *Title page.* Life in northern Canada hunting and trapping among the Indians and whites.

LAUT, A. C. *Story of the Trapper.* New York: D. Appleton & Co., 1902. $1.25.

The romance of the north woods is interwoven with a history of trapping and the Hudson Bay Company.

SANDYS, E. W. *Trapper "Jim."* New York: Macmillan Co., 1922. $1.25.
A story for the boy which will fascinate him and give him a feeling of the woods and its lure.

SHUBERT, A. B., Inc. *The Art of Trapping.* Chicago: Pub. by the Company, 1917.
"A complete description of the North American fur bearers, their habits, range, how to make a success of trapping, and other information of great value to the trapper and fur collector."

VERRILL, A. H. *How to Trap and Why* (in his *The Book of Camping*, p. 135–169. 1919. New York: Barse & Hopkins, $1.00).
Interestingly written and practical rather than technical. He includes the curing of hides and skins and the making of moccasins as well as traps and snares.

ARCHERY

Interest in this ancient pastime has been greatly revived in the past ten or fifteen years with the result that there are now available at least a half dozen authoritative books on the subject which are up to date. In addition to those works which give the fundamentals of archery, there are a few which deal with special phases of the sport. Of these, those dealing with hunting receive the most note. The books on this subject are supplemented by two monthly periodicals, *Ye Sylvan Archer* and *Archery Review*, which deal exclusively with archery and will interest any enthusiastic archer.

DECKER, G. C. *Bows and Arrows for Boys.* Milwaukee: Bruce Pub. Co., 1930. $.75. Pam.
How to make your bow and arrow, accessories, how to shoot, and suggestions for organizing a club are given. A short list of books and articles on archery is included in the back.

DUFF, J. L. *Bows and Arrows.* New York: Macmillan Co., 1932. $1.00.
1927 edition priced at $2.00 and edited by Edward Cave.
"A valuable book for camps, boy scouts, and all those interested in making bows, arrows, and accessories. . . ." *Rounsevelle.*

ELMER, R. P. *Archery.* Philadelphia: Penn Pub. Co., 1926. $5.00.
The foremost authority on archery, Elmer is the author of the archery article in the 14th edition of the *Encyclopaedia Britannica* as well as the definitions in the *New International Dictionary*. Archery is taken up historically, then tournament play and management are discussed. How to construct bows and arrows is fully covered. Glossary and brief bibliography. Excellent book for libraries.

LAMBERT, A. W. *Modern Archery.* New York: A. S. Barnes & Co., 1929. $3.00.
"A scientific treatise on modern shooting equipment for an experienced archer." *Rounsevelle.*

POPE, S. T. *Hunting with Bow and Arrow.* New York: G. P. Putnam's Sons, 1925. $2.50.
Has a chapter by Stewart Edward White. Covers a phase of archery which Elmer omits, but also gives much that is found in more general books. Similar to his *Adventurous Bowmen* (see page 124) but more thrilling. "Every archer should read this book. . . ." *Rounsevelle.*

ROUNSEVELLE, PHILLIP. *Archery Simplified.* New York: A. S. Barnes & Co., 1931. $2.00.
A very practical book for instructor and beginner. Together with Elmer's book this covers the subject completely and thoroughly for beginner and expert.

His section devoted to the literature of archery is particularly useful. He has a pamphlet, *Student's Handbook of Archery* (1932, Barnes, $.25) which gives in compact form some of the main points in his larger work.

SUMPTION, DOROTHY. *Archery for Beginners.* Philadelphia: W. B. Saunders Co., 1932. $1.60.

A practical, well-rounded book for novice and instructor. Glossary of terms is useful and her chapter on related archery activities is interesting. Illustrations, bibliography, and index.

OUTDOOR LIFE

This is a broad heading which could involve the whole of section two; as used here it will include a few books on how to make things for use in outdoor recreations, a few general books, and one or two on the joys of the woods and the outdoors. Most of the general periodicals, as well as nearly all of the more specialized ones (in this field) devote considerable space to the subject; many newspapers have outdoor sections, separate from the regular sports section or page. Some of our best essayists of the nineteenth century did their best work telling of their love for the woods and its lure. Notable among these were Thoreau, Emerson, Lowell, Burroughs, Hawthorne, Henry Van Dyke, and Warner.

ADAMS, J. H., and others. *Harper's Outdoor Book for Boys* (Harper's Practical Books for Boys). New York: Harper & Bros., 1907. $2.00.

Analytics for: boat building and winter sports.

A well-illustrated book on how to make and do things outdoors. Somewhat old but a standard work.

BEARD, D. C. *Do it Yourself* (Woodcraft series). Philadelphia: J. B. Lippincott & Co., 1925. $2.50.

"There are five chapters on fishing and two on canoeing. Other subjects are Arbor Day forestry, stalking wild animals, and collecting specimens." *Pittsburgh.*

BROOKS, E. A. *Handbook of the Outdoors.* New York: Doubleday, Doran & Co., Inc., 1925. $2.00.

"This handbook is intended not as a manual of camping and woodcraft but as an inspirational guide to the things of outdoors, for use of leaders of boys' and girls' clubs, Sunday school teachers and others engaged in religious education. The book tells where to go, what to do and how to get the most out of the outdoor activities." *Book Review Digest.*

HALL, A. N. *Outdoor Boy Craftsmen at Home, in Field and Woods, and in and on the Water.* Boston: Lothrop, Lee & Shepard Co., 1925. $2.50.

"Directions for making equipment for outdoor activities. Boy scouts will be especially interested in the ten chapters on camping, and in the descriptions of trek carts and kits for hiking and bicycle trips." *Pittsburgh.* Most of the material is selected from magazine and newspaper articles.

HOLLIMAN, JENNIE. *American Sports (1785–1835).* Durham, North Carolina: Seaman Press, 1931. $2.00.

Discusses the development of American sport in the first fifty years of the country. Treats hunting in its various forms at some length and covers many other sports more briefly. Has a long bibliography of older newspapers, periodicals, and reports. Indexed. See contents for sports treated.

MILLER, W. H. *The Sportsman's Workshop.* New York: D. Appleton & Co., 1921. $1.25.

Hints for making your own equipment for use in camp, hikes, hunting or fishing; as well as how to set up your workshop.

VANDYKE, J. C. *The Open Spaces, Incidents of Nights and Days Under the Blue Sky.* New York: Chas. Scribner's Sons, 1922. $2.00.

The beauty of being in the open, to sleep with stars above, to tramp in the woods, to fish and hunt. The author writes from experience under western skies.

WALLACE, DILLON. *Packing and Portaging* (Outing handbooks). New York: Outing Pub. Co., 1912. $.70.

An excellent book for the young outdoor lover, especially the camper, hiker, or canoeist.

WHITE, S. E. *The Forest.* New York: Doubleday, Page & Co., 1903. $2.00.

The lover of the great outdoors should enjoy this story of the woods, and if he reads closely will find there is much practical advice contained as well. An appendix "Suggestions for Outfit" is of note. Mr. White has many other books, mostly novels, based on outdoor life which will interest the reader.

CAMPING

Camping may be broadly divided into two kinds: organized camping where there is someone definitely in charge and a fee is usually paid by the campers, and unorganized camping which includes overnight stays while on hiking, hunting, fishing, or canoe trips. The book literature seems to fall into these same two classes. Fundamentally the methods are the same although the objects and ideas differ. The literature will therefore overlap and what is written essentially for the organized camp will also be of help and value to the overnight camper. It should be said here that some of the best material is in pamphlet form and is issued by the Camp Fire Girls of America, Boy Scouts of America, and Girl Scouts of America. These organizations have numerous booklets, each specifically for their own needs, but valuable to others as well. They may be secured from the publication offices for a small sum.

Organized Camps

ALLEN, H. K. *Camps and Their Modern Administration.* New York: Womans Press, 1930. $1.75.

Practical suggestions to help in the actual running of camps, as well as in building layouts and placing of equipment. Based on work carried on in Y.W.C.A. camps.

COALE, A. W. *Summer in the Girls' Camp.* New York: Century Co., 1919. $1.75.

"Description of the educational and physical benefits of camp life. Of value to parents and conductors of camps as well as to the girls themselves." *Pittsburgh.*

DIMOCK, H. S., and HENDRY, C. E. *Camping and Character.* New York: Association Press, 1929. $3.50.

"The book is carefully and lucidly written and contains sections that should be in the hands of every camp director and counselor. . . ." *Survey.*

GRAHAM, ABBIE. *The Girl's Camp.* New York: Womans Press, 1933. $1.50.

A book for the director of the girl's camp which should aid her to see through many of the problems which might arise. The stress is on character building in camps. Supplements Allen's book.

HOFER, M. R. *Camp Recreations and Pageants.* New York: Association Press, 1927. $2.00.

"Suggestions for daytime activities and night stunts, with material for pageants and other dramatic entertainments. Written primarily for use in boys' camps, but can be adapted to the needs of other groups." *Cleveland.*

JESSUP, ELON. *Boys' Book of Camp Life.* New York: E. P. Dutton & Co., 1928. $2.50.

"Useful information on many phases of camp life. In addition to more usual topics, the following are considered: feet and footgear; field glasses, sun glasses and cameras; measuring distances; washings and mendings." *Booklist.*

MASON, B. S. *Camping and Education.* New York: McCall Co., 1930. $3.00.

By going directly to boys and girls in camps and asking them questions about camp life, Professor Mason, of the Sociology Department at Ohio State University, was able to get accurate data. This is a summary of these interviews and should be of great value to camp leaders.

PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. *Camping Out.* New York: Macmillan Co., 1924. $2.00.

Edited by L. H. Weir. Also published by the Association.

"A manual of organized camping containing detailed information on camp organization, management, equipment, program, and leadership." *C. F. Smith* in his *Games and Game Leadership.*

This is now the National Recreation Association.

SARGENT, PORTER. *Handbook of Summer Camps* (Sargent's handbooks). Boston: Porter Sargent. $5.00.

An annual survey of camps. Revised and corrected each year, it is the best source of information for data of this kind.

WILLIAMS, E. E. *Keeping Campers Fit.* New York: E. P. Dutton & Co., 1934. $2.50.

Primarily for the nurse of a girls' camp, it is also useful for any camper. Tells what medical equipment to take on hiking, canoeing, and camping parties; how to treat ills and injuries, and what to expect.

Unorganized Camping

BEARD, D. C. *American Boys' Handybook of Camp-Lore and Woodcraft* (Woodcraft series). Philadelphia: J. B. Lippincott & Co., 1920. $3.00.

"Fire making, camp cooking, the packing of horses and dogs are among the topics treated. A program for a council fire is included and there are numerous illustrations by the author." *Pittsburgh.* Another book by this same expert woodsman and in the same series is his *Wisdom of the Woods* (1926, Lippincott, $3.00) which gives many rules for use in the woods and much of real practical value.

———. *Shelters, Shacks, and Shanties.* New York: Chas. Scribner's Sons, 1914. $1.75.

Practical advice on building camp shelters and furniture by the outstanding leader of boy scouts in the world.

CHELEY, F. H. *Boys' Book of Camp Fires.* Boston: W. A. Wilde Co., 1925. $2.50.

"Directions for making all sorts of fires with recipes and advice for outdoor cooking comprise about half of the book or Part I. Part II includes stunts and games, camp songs and campfire handicraft; Part III, camp stories and a selection of outdoor verse. A welcome addition to the shelf of camp books." *Booklist.*

HEMING, ARTHUR. *The Drama of the Forests.* New York: Doubleday, Doran & Co., Inc., 1921. $5.00.

Life and adventure in the north woods. "A splendid gift book for a boy of high school age who loves the outdoors, or for his father." *Booklist.*

JESSUP, ELON. *Camp Grub.* New York: E. P. Dutton & Co., 1924. $3.50.

What to prepare and how to prepare it are fully treated. The book is practical and will aid the camp cook, whether in a large camp or in a small informal group around a campfire.

———. *Roughing it Smoothly.* New York: G. P. Putnam's Sons, 1923. $2.50.

How to camp with the least effort and the greatest comfort. Similar to Stewart Edward White's book *Camp and Trail* (1907, Doubleday, $2.00) which is now outdated but a valuable contribution nevertheless.

KEPHART, HORACE. *Camping and Woodcraft.* New ed. 2 v. in 1. New York: Macmillan Co., 1921. $2.50.

The best and most comprehensive available. There are several editions, most of them in two separate volumes, but this handy edition will be the most serviceable in the woods. Another similar book, but lacking Kephart's excellent index and less thorough in its treatment, is Fordyce's *Trail Craft* (1922, Appleton, $2.50).

MILLER, W. H. *Camping Out.* New ed. New York: D. Appleton & Co., 1925. $2.50.

Same as the 1918 edition published by Doran except for the addition of a short appendix on additional equipment. Mr. Miller covers the field sensibly and thoroughly. It is one of the best.

PINKERTON, K. S. *Woodcraft for Women* (Outing handbooks). New York: Macmillan Co., 1916. $1.00.

The woman in the woods; how to take care of herself and what to take, whether hiking, camping, hunting, fishing, or portaging, winter or summer. A complete, yet concise book.

TOWNSEND, A. H. *Camping and Scouting Lore.* New York: Harper & Bros., 1920. $3.00.

A book on camping which will be particularly attractive to boy scouts, girl scouts, and camp fire girls.

WILDER, J. A. *Jack-Knife Cookery.* New York: E. P. Dutton & Co., 1929. $2.00.

Line drawings by the author.

"The requisites for independent and enjoyable wilderness life are discussed in a spirited and thought-provoking manner. The book includes tested recipes, directions for fires for various purposes, advice concerning camp equipment, and first aid. The author's experience in foreign lands and diverse regions in America adds fresh interest to the subject." *Booklist.*

CANOEING

CAMP, W. C. ed. *Canoeing* (in his *Book of Sports and Games*, p. 61–82. 1923, New York: T. Y. Crowell Co. $2.00).

Topics discussed are: building a canoe; size and weight; learning to paddle; if the canoe upsets; portaging; canoe racing; canoe sailing.

CLAUSSEN, W. V. B. *Canoeing.* New York: Boy Scouts of America, 1931. $.75. Pam.

Written primarily for boy scouts, it is useful to all. How to handle a canoe, safety in a canoe, sailing, repair work, and regattas are discussed. Practical. Illustrated.

JESSUP, ELON. *Boys' Book of Canoeing; All About Canoe Handling, Paddling, Poling, Sailing, and Camping.* New York: E. P. Dutton & Co., 1926. $2.00.

Comprehensive and instructive covering all phases of canoeing. Has good diagrams, drawings, and photographs.

MILLER, W. H. *Canoeing, Sailing, and Motor Boating.* Rev. ed. New York: D. Appleton & Co., 1928. $3.00.

The 1917 edition, published by Doran, had the title *Boys' Book of Canoeing and Sailing.* Construction and handling of sail boats and canoes of various kinds.

PULLING, A. V. S. *The Elements of Canoeing.* Ann Arbor, Mich.: Ann Arbor Press, 1933. $2.00.

SAILING

A sport which is widely followed wherever there is water, sailing is also one of the most thrilling. Yachting often includes power boats and for this reason the term is not used; this list not including any sports which involve motors. In the last two years there have been several excellent works on sailing. The most famous race is that for the "America's" Cup; a race with nearly one hundred years of background. Several sailing periodicals are included in the list in Appendix II.

BOARDMAN, E. A. *Yacht Racing.* Boston: Little, Brown & Co., 1931. $4.00.

Mr. Boardman is a yachtsman of experience and writes with enthusiasm which is sincere. He covers many points which others omit, among them the expense involved, value of good judges for races, comparison of amateur and professional helmsmen, and something of the future of yachting.

CALAHAN, H. A. *Learning to Sail.* New ed. New York: Macmillan Co., 1933. $2.50.

An excellent book for beginner and veteran, well illustrated with photographs, diagrams, and drawings. Fills a real need.

———. *Learning to Race.* New York: Macmillan Co., 1934. $3.50.

A companion volume to his earlier book noted above. This gives advice of a practical nature to the person who has learned to sail but has not learned to race. Has a chapter on sportsmanship.

CURRY, MANFRED. *Racing Tactics in Questions and Answers.* New York: Chas. Scribner's Sons, 1932. $6.00.

By diagrams the author explains rules and many points of racing. This German authority has won more than one thousand prizes as a racer. He has a more recent book, *Yacht Racing* (New enl. ed. 1933, Scribner, $7.50) which treats of the "aerodynamics of sails and racing tactics." *Title page.*

HILLS, G. E. *The Sailing Rules in Yacht Racing.* New York: Chas. Scribner's Sons, 1933. $2.75.

Foreword by C. D. Mallory, President of the North American Yacht Racing Union (1933).

Rules of yacht racing interpreted and applied in reference to specific cases. Charts, diagrams, and illustrations clarify it. The author is Chairman of the Racing Committee, Hingham Yacht Club, and a member of the Committee on Junior Yacht Racing.

IRVING, JOHN, and MARTIN, E. G. *Cruising and Ocean Racing* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1933. $5.00.

LOOMIS, A. F. ed. *Yachts Under Sail.* New York: Wm. Morrow & Co., 1933. $3.00.

"The photographs which make up this book were selected for their intrinsic beauty and for their technical portrayal of different types of yachts and various aspects of yacht racing. The book consequently will appeal to the layman as a delightful picture book, and to the sailor as a valuable record of American yachting since the war. Attractively bound in white sail cloth." *Booklist.*

———. ed. *The Yachtsman's Yearbook 1934.* New York: Dodd, Mead & Co., Inc., 1934. $3.00.

"A record of the big events of the 1934 sailing season, with accounts of the year's cruises and races." *Publishers' Weekly.* An annual publication.

SCHOETTLE, E. J. ed. *Sailing Craft.* New York: Macmillan Co., 1928. $12.00. Cheaper edition 1934 for $4.00.

A complete treatise on sailing written by persons widely known in the field.

THOMPSON, W. M., and others. *The Yacht "America."* Boston: Charles E. Lauriat Co., 1925. $4.00.

"A history of the famous schooner that won the cup at the International races at Cowes, England, 1851, from the time it was built until it was given a place of honor at the Naval Academy in 1921." *Pittsburgh.*

BOAT BUILDING

Libraries receive innumerable requests from boys as to how to build boats. These young people are not interested in a general book, but in one which will give working drawings, instructions, and materials needed. With this in mind, the following brief list is included to aid the librarian in meeting this demand. Many of the more general books on canoeing and sailing also contain aids for building, but these seem to be directly concerned with the problem.

ADAMS, J. H., and others. *Harper's Outdoor Book for Boys* (Harper's Practical Books for Boys). New York: Harper & Bros., 1907. $2.00.

See chapters on "Boats," p. 211–238; "Catamarans," p. 239–248; "House-Boats and Rafts," p. 261–279.

How to build boats of all kinds, simply explained. Good illustrations.

BROWN, SAM. ed. *Boat Book.* Chicago: Popular Mechanics Press, 1931. $3.00.

"Directions for building small boats, canoes, and rowboats, sailboats and power craft, including both inboard and outboard motors. A list of required materials, illustrations, charts, and diagrams accompanies each set of directions." *Cleveland.*

HORST, C. W. *Model Sail and Power Boats.* Milwaukee: Bruce Pub. Co., 1933. $2.00.

"Complete dimensional plans and instructions for building eleven model motor and sail boats of various dimensions. Glossary of nautical terms, page 93." *Booklist.*

LEITCH, A. C. *Miniature Boat Building.* New York: Norman W. Henley Pub. Co., 1928. $3.00.

"The construction of working models of racing, sail and power boats. A concise and complete practical treatise for the amateur and professional mechanic giving specific instructions in simple language on the various processes and operations." *Title page.* Similar to Horst.

MONK, EDWIN. *Small Boat Building for the Amateur.* New York: Chas. Scribner's Sons, 1934. $3.00.

". . . with sixteen modern small boat designs, rowboats, sailboats, outboards,

A-125-class hydroplane and a runabout." *Title page.* Gives detailed lumber orders for each design, general and specific instruction for designs and their choice, how to assemble, and, in all, is a real contribution by an experienced naval architect. Illustrations and plans.

MOORE, THOMAS. *Build a Winning Model.* New York: F. A. Stokes Co., 1928. $3.50.

While it deals primarily with model yachts, the young builder can apply the specifications to full-size boats. How to build and what to use is included.

HIKING

Most of the books on hiking or walking include a certain amount of material on camping as well. Similarly, with books on camping. Mountaineering may be considered as a type of hiking but is so specialized as to receive special consideration under a separate head.

CHRISTY, B. H. *Going Afoot.* New York: Association Press, 1920. $1.35.

"Tells how, when and where to walk." *Pittsburgh.* A valuable contribution to the hiker's library. Of special interest are the chapters on "Walking Clubs in America" and "Organization and Conduct of Walking Clubs." The bibliography, pages 143–148, is representative of the best up to 1920.

FORDYCE, C. P. *Touring Afoot* (Outing handbooks). New York: Macmillan Co., 1922. $1.00.

Practical for the hiker and for the camper. How to take care of yourself, and what to take in grub and clothing, winter or summer.

GRAHAM, STEPHEN. *Gentle Art of Tramping.* New York: D. Appleton & Co., 1926. $2.50.

"It is a gentle art. Know how to tramp and you know how to live." *Text, page 1.* This is the theme of the book. Mr. Graham is experienced; he takes it up, not as an afternoon or overnight hike, but as a trip of several months duration. Informal and leisurely, it shows an appreciation of nature. Good reading and adequate.

STODDARD, C. C. *Shank's Mare.* New York: Doubleday, Doran & Co., Inc., 1924. $2.50.

"Essays on the pleasures of walking and the adventures incident thereto." *Pittsburgh.*

TORREY, R. H., and others. *The New York Walk Book.* New and rev. ed. New York: Dodd, Mead & Co., Inc., 1934. $2.50.

The earlier edition was published in 1923.

". . . excursions afoot within a radius of 50 to 150 miles of the city including forest trails in mountain regions." *Title page.* The foreword is by Dr. John H. Finley. Contains maps, illustrations, and bibliographies. A fine book for the lover of hiking, especially the New Yorker.

TOWNE, C. H. *Loafing Down Long Island.* New York: Century Co., 1921. $2.50.

"A hiker's week end tramps carried out in defiance of all traffic dangers and personal opinions of speed fiends. Told in holiday mood, they take on a charm of exploration and remoteness, which should be an inspiration to the city-bound, especially of New York. The genial essay flavoring is heightened by interesting drawings." *Booklist.*

MOUNTAINEERING

By its very nature mountaineering is limited to certain sections of the country. In those parts fortunate enough to have mountains, the sport is common and one full of thrills. Abroad, especially in the Alps

and Himalayas, it is equally popular. Many people who live where there are no mountains enjoy the sport; libraries would do well to remember this point. The fight to conquer Mt. Everest has been of such importance and significance that several books are entered under that head. Mountaineers in particular will be interested in them, while geographers, scientists, and the general public will find them good reading.

ABRAHAM, G. D. *First Steps to Climbing.* New York: Robert M. McBride & Co., 1925. $1.50.

A book for the beginner, full of common sense. Equipment suggested; readable and practical.

COLLINS, F. A. *Mountain Climbing.* New York: Century Co., 1923. $2.00.

One of the best general books on the subject. It is a survey of the conquest of many peaks and gives valuable information to the young mountaineer. A chapter on "Mountain Tragedies" serves as a warning to take care. Illustrated.

MILLS, E. A. *The Adventures of a Nature Guide.* New York: Doubleday, Doran & Co., Inc., 1920. $3.50.

"Anyone who enjoys adventures of mountain-climbing will delight in these experiences. . . ." *Booklist.*

PIUS XI, Pope of Rome. *Climbs on Alpine Peaks.* New York: Houghton Mifflin Co., 1923. $2.00.

Translated by J. E. C. Eaton; foreword by Douglas W. Freshfield; introduction by L. C. Casartelli.

"The general reader will find this volume an instructive addition to his library; the mountaineer will respect it from a professional as well as a literary viewpoint." *Springfield Republican.*

RAEBURN, HAROLD. *Mountaineering Art.* New York: F. A. Stokes Co., 1920. $3.75.

"Apart from the instruction he gives to the novice, Mr. Raeburn has done the mountaineering public a service by composing a work which sets forth the latest views on the best mode of 'climbing and mountaineering.'" *Times (London) Literary Supplement.*

ROBBINS, L. H. *Mountains and Men.* New York: Dodd, Mead & Co., Inc., 1931. $3.00.

"Stories of the first attempts and final ascents of mountain peaks in all parts of the world long inaccessible to adventurous climbers. The difficulties met with and technique employed to overcome them are emphasized more than the triumphs." *Pittsburgh.*

WASHBURN, BRADFORD. *Among the Alps with Bradford.* New York: G. P. Putnam's Sons, 1927. $1.75.

A sixteen-year-old boy, climbing in the Alps, tells of his experiences. A book which boys fond of adventure and the outdoors will want to read.

YOUNG, G. W. ed. *Mountain Craft.* 3d ed. New York: Chas. Scribner's Sons, 1934. $7.50.

A valuable and comprehensive work in which mountaineering in all parts of the world is taken up. The use of skiis in this type of climbing is considered. Footnotes, illustrations, diagrams, and maps add to its usefulness.

Mount Everest

The five books noted here cover the three expeditions to climb Mt. Everest that took place in 1921, 1922, and 1924. The book by Young-

husband is a summary of all three and will be the most useful in the average library. The others will be wanted in the larger libraries and by the enthusiastic mountaineer.

BRUCE, C. G., and others. *Assault on Mount Everest, 1922.* New York: Longmans, Green & Co., 1923. $7.50.

An admirable account of the first expedition to reach the 27,000-foot level on the highest of all peaks. Preparation, equipment, hardships encountered, and results are discussed.

HOWARD-BURY, C. K., and others. *Mount Everest; the Reconnaissance.* New York: Longmans, Green & Co., 1921. $7.50.

The first survey was made in 1921. This tells the results. Well illustrated.

NOEL, J. B. L. *The Story of Everest.* Boston: Little, Brown & Co., 1927. $4.00.

Official photographer on the 1922 and 1924 expeditions.

The attempts to conquer Mt. Everest should be of interest to every mountaineer. "Captain Noel describes his penetration into forbidden lands, his expeditions up inhospitable slopes of Mount Everest, and the tragic culmination of the expedition of 1924. . . ." *Booklist.*

NORTON, E. F., and others. *Fight for Everest: 1924.* New York: Longmans, Green & Co., 1925. $7.50.

His unfortunate expedition carried the work 1,000 feet higher than that described by Bruce; they reached 28,100 feet before they were forced back.

YOUNGHUSBAND, F. E. *Epic of Mount Everest.* New York: Longmans, Green & Co., 1926. $3.00.

"There have been three expeditions to Mt. Everest, one in 1921, one in 1922, and more recently, one in 1924, and an account of each of these has been written by members of the separate expeditions. Sir Francis Younghusband, who is Chairman of the Mount Everest Committee, has combined into a single narrative the thrilling material contained in the three first-hand accounts of heroic attempts at a feat still unaccomplished." *Book Review Digest.*

There have been one or two more recent parties, too late to be included in Younghusband's book.

HORSEMANSHIP

The term horsemanship as used in this bibliography is meant to include horseback riding, polo, hunting, and care and training of the horse. It includes everything except horse racing, although some books will have a certain amount of material on this. There are numerous books dealing with horses and horsemanship; all phases are covered adequately in book form.

BARETTO DE SOUZA, J. M. T. *Principles of Equitation.* New York: E. P. Dutton & Co., 1925. $5.00.

"An enlarged revised edition of *Elementary Equitation* with important new chapters and illustrations." *Title page.* Drawings by Victor Nickol.

"Many books have been written to instruct the novice in riding. But there has been none that so clearly, so logically with so much precision and so much detail inculcates correct principles as this one, by a great master of the art." *New York Times.*

———. *Advanced Equitation.* New York: E. P. Dutton & Co., 1926. $7.00.

For the experienced rider.

BROOKE, G. F. H. *Horse-Sense and Horsemanship of Today*. New York: Chas. Scribner's Sons, 1924. $5.00.

Revised edition published in 1933 by Constable, 15s.

"This book should be owned and studied carefully by all men who hunt or play polo or take any active interest in horses. It is easily the best work on the subject published in recent years." *Times (London) Literary Supplement.*

———. *The Way of a Man With a Horse* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1929. $7.00.

The horse for riding and as a patient for the veterinarian is fully covered.

CHRISTY, E. V. A. *Cross Saddle and Side Saddle; Modern Riding for Men and Women*. Philadelphia: J. B. Lippincott & Co., 1932. $5.00.

"Full, detailed instructions on horseback riding by an English authority. The volume contains many illustrations, including photographs and diagrams. Glossary. Index." *Book Review Digest.*

HANCE, J. E. *School for Horse and Rider*. New York: Chas. Scribner's Sons, 1932. $3.75.

This should improve your riding, whether you are experienced or inexperienced. Good photographs.

MCCARTNEY, SINGERLY. *A Short Cut to Good Riding*. New York: Duffield & Co., 1932. $2.50.

Written in a popular style and having less technique than either McTaggart or Hance.

MCTAGGART, M. F. *Art of Riding*. New York: Chas. Scribner's Sons, 1931. $3.50.

Primarily for the beginner, by an expert cavalry man. Readable, with excellent descriptive photographs.

———. *Hints on Horsemanship*. 2d ed. Philadelphia: J. B. Lippincott & Co., 1929. $2.50.

This edition differs from the earlier one in that the drawings are somewhat changed and that there is a new chapter, at the end, which every beginner should read. The handling of horses and how to ride is the chief topic. Sketches good.

MADDISON, IVY. *Riding Astride for Girls*. New York: Henry Holt & Co., Inc., 1923. $4.00.

Riding for girls is fully discussed. Shows, jumping, hunting, types of horse, correct dress, and correct form are among the points covered.

WINTER SPORTS

The general heading includes all winter sports with the exception of curling, ice hockey, and skiing. These are given separate heads; curling and ice hockey in Part I, skiing in Part II. This general head, then, will cover such popular sports as ice skating, snow shoeing, tobogganing, ice boating, sled-dog racing, sleighing, and the like. As the books are general, most of them cover all of these sports. The general books will also contain material on the three given separate heads. Every library which is located where winter sports can be held should have at least one of the general books on its shelves.

ADAMS, J. H., and others. *Harper's Outdoor Book for Boys* (Harper's practical books for boys). New York: Harper & Bros., 1907. $2.00.

See chapters on "Coasters, Skiis, and Snowshoes," p. 101–114; "Sail-skating and Snowball Artillery," p. 115–119.

Practical instruction on making equipment for these popular winter sports. Illustrated.

DIER, J. C. ed. *A Book of Winter Sports.* New York: Macmillan Co., 1912. $1.50.

Analytic for curling.

Consists of a series of articles on ice-yachting, skating, ice hockey, curling, snow-shoeing, skiing, tobogganing, and sleighing. Old but useful.

JESSUP, ELON. *Snow and Ice Sports; a Winter Manual.* New York: E. P. Dutton & Co., 1923. $3.50.

This is one of the best, covering all phases of winter sports.

LYTTON, NEVILLE, and others. *Winter Sports* (Lonsdale Library of Sports, Games and Pastimes). Philadelphia: J. B. Lippincott & Co., 1930. $7.00.

A scholarly treatment with an English point of view.

THIRD OLYMPIC WINTER GAMES COMMITTEE. *Official Report. III Olympic Winter Games, Lake Placid, 1932.* Lake Placid, N. Y.: Pub. by the Committee, 1932. $1.50.

See page 95, under Olympic Games, for description.

WHITE, W. D. *Book of Winter Sports.* Boston: Houghton Mifflin Co., 1925. $3.00.

Analytic of curling.

In a popular style, Mr. White includes many words of wisdom, instructional and recreational, on winter camping, hiking, fishing, hunting, mountaineering, as well as the usual winter sports.

SKIING

More books have been written on this sport than on any other one winter sport. Skiing in itself requires skill and practice; most anyone can slide down a hill, few can jump, turn, or travel cross-country with ease. The books noted below take up all sides of skiing, they are up to date, and are by recognized authorities. Northern libraries will find the requests for such books increasing; the demand should be met.

ALBIZZI, MARQUIS. *Short Advice on Skiing.* Quebec, Canada: Pub. by the author, 1930. $.75. Pam.

Explains principal terms, tells briefly how to jump and has a bit about equipment. A practical booklet with illustrations and diagrams.

CAULFIELD, VIVIAN. *Skiing Turns.* New York: Chas. Scribner's Sons, 1923. $3.00.

Until one has mastered turns one is not an expert. The author handles the subject in an excellent manner describing each turn carefully.

FURSE, KATHARINE. *Ski-Running.* New York: Longmans, Green & Co., 1924. $1.40.

Equipment, precautions, and practice necessary for good ski-running are discussed. Emphasis is on cross-country work rather than jumping.

JESSUP, ELON. *Skiis and Skiing.* New York: E. P. Dutton & Co., 1929. $2.00.

The entire sport of skiing is covered in a manner which will arouse your interest, that of the young boy in particular.

LUNN, A. H. M. *Complete Ski-Runner.* New York: Chas. Scribner's Sons, 1930. $4.50.

The author was President of the Ski Club of Great Britain at the time he wrote this book.

Mr. Lunn, the leading authority on skiing, limits this book to downhill skiing. Jumping and mountaineering are not included. Excellent photographs and diagrams of turns.

LUNN, A. H. M. *History of Skiing.* New York: Oxford Univ. Press, 1927. $2.00.

The most complete recent history of the sport.

———. *Skiing for Beginners.* New York: E. P. Dutton & Co., 1924. $2.00.

A book which will slip into your pocket to take with you as you first try out your skiis. Practical and useful.

POULSEN, ORNULF. *Skiing; With a Chapter on Snowshoeing.* New York: Macmillan Co., 1924. $2.00.

One of the most authoritative books written. Boys in particular will enjoy reading this work. The chapter on snowshoeing is one of the best on the subject.

PROCTOR, C. N., and STEPHENS, R. R. *The Art of Skiing.* New York: Harcourt, Brace & Co., 1933. $2.00.

This, written for the American sportsman, includes chapters on equipment and ski-touring. Diagrams.

APPENDICES

I

ORGANIZATIONS PUBLISHING MATERIAL ON SPORTS AND RECREATIONS

(From Playground and Recreation Association of America, *Recreative Athletics*, 1929)

Amateur Athletic Union of the United States. 233 Broadway, New York City.
American Bicycle League of America. 3117 Beverly Road, Brooklyn, New York.
American Canoe Association. 1706 Kenilworth Ave., Chicago.
American Lawn Bowling Association. 71 Simpson St., Somerville, Massachusetts.
American Olympic Committee. 233 Broadway, New York.
American Paddle Tennis Association. 285 Madison Ave., New York.
American Physical Education Association. 311 Maynard St., Ann Arbor, Mich.
American Snowshoers Union. 53 Knox St., Lewiston, Maine.
Athletic League of North America. % National Committee, Y.M.C.A., 347 Madison Ave., New York.
Bonarro Association. California By-Products Company, San Francisco.
Intercollegiate Association of Amateur Athletes of America. 57 E. 56th St., New York.
International Skating Union of America. 52 Wall St., New York.
Junior Olympic Games. 202 Keller Building, Louisville.
National Amateur Athletic Federation. 6 N. Michigan Ave., Chicago.
National Amateur Athletic Federation, Women's Division. 303 West 42nd Street, New York.
National Archery Association. Ledgers Road, Newton Center, Massachusetts.
National Baseball Federation. 1829 Guarantee Title Bldg., Cleveland.
National Horseshoe Pitchers Association. Hibbing, Minnesota.
National Polo Association. 347 Madison Ave., New York.
National Public Parks Tennis Association. 2001a E. Warne Ave., St. Louis.
National Recreation Association. 315 Fourth Ave., New York.
National Rifle Association. Woodward Bldg., Washington, D.C.
National Ski Association. Washington, D.C.
National Trap Shooting Association. Vandalia, Ohio.
Playground and Recreation Association of America, now the National Recreation Association.

Skate Sailing Association of America. 315 Fourth Ave., New York.
Sportsmanship Brotherhood, Incorporated. Hotel McAlpin, New York.
United States Amateur Hockey Association. 4740 Maripol, Pittsburgh.
United States of America Football Association. 136 Liberty St., New York.
United States Field Hockey Association. 380 Marlboro St., Boston, Massachusetts.
United States Golf Association. 110 E. 42nd St., New York.
United States Intercollegiate Lacrosse Association. 101 Park Ave., New York.
United States Lawn Tennis Association. 120 Broadway, New York.
Women's Athletic Section, American Physical Education Association. 311 Maynard Street, Ann Arbor, Michigan.

II

PERIODICALS DEALING WITH SPORTS AND RECREATIONS

This list is based on information given in Ayer's *Directory of Newspapers and Periodicals*, 1933, and Faxon's *1933–1934 Guide*. It includes none that deal with fiction alone. Prices are not listed here as they vary according to location and length of subscription. Periodicals which are indexed in one or more of the periodical indexes have such indicated. The list does not include all that are published; athletic club and country club publications, foreign language periodicals published in the United States, and a few which do not directly concern this phase are omitted. There are a few of the more general titles listed here as they frequently have material concerning this subject. The order of the entry is title, frequency of publication, place, indexes, and subjects covered.

Alabama Sportsman (mo). Birmingham, Alabama. Hunting and fishing.
All Outdoors (mo). Los Angeles. Outdoor sports.
Amateur Athlete (mo.) New York. Amateur athletics, track and field.
Amateur Golfer and Sportsmen's Magazine (mo). Minneapolis. Outdoor sports.
American Boy (mo). Detroit. Boy's magazine.
American Cricketer (mo). Philadelphia. Cricket.
American Field (weekly). Chicago. Hunting and dogs.
American Forests (mo). Washington, D.C. Agricultural Index, Magazine Subject Index, P.A.I.S., Engineering Index. Forestry and outdoor subjects.
American Girl (mo). New York. Girl scouts.
American Golfer (mo). Greenwich, Connecticut. Golf.
American Horse Breeder (weekly). Boston. Trotting horses.
American Lawn Tennis (15 times per year). New York. Tennis.
American Rifleman (mo). Washington, D.C. Rifle (military and sporting).
American Sportsman (weekly). Cleveland. Turf interests.
Archery Review (mo). Tulsa, Oklahoma. Archery.
Arena (mo). Philadelphia. Sports.
Athletic Journal (mo. except July and August). Chicago. School and college athletics.
Baseball Magazine (mo). New York. Baseball.
Beach and Pool (mo). New York. Water sports, beach, and pool.
Billiards Magazine (mo). Chicago. Billiards.
Boating Business for Dealers and Builders (mo). Chicago. Boat industry.
Bowlers Journal (40 numbers per year). Chicago. Bowling.
Boxing Blade (weekly). Minneapolis. Boxing.
Boys' Life (mo). New York. Boy scouts.
Bridle and Golfer (mo). Detroit. Society and sports.
Bridle and Golfer (mo). Toronto. Society and sports.

Camping (mo. except July, August, September). Ann Arbor, Michigan. Camping.
Canada Daily Running Horse (daily). Toronto. Horse racing.
Canadian Geographical Journal (mo). Montreal. Magazine Subject Index, P.A.I.S. Outdoor life.
Canadian Golfer (mo). Brantford, Ontario. Golf.
Canadian Lawn Tennis (mo). Montreal. Tennis.
Canadian Marksman (mo). Ottawa, Ontario. Rifle.
Canadian Sportsman (weekly). Woodstock, Ontario. Horse racing.
Chase, The (mo). Lexington, Kentucky. Fox and coon hounds and hunting.
Cleveland District Golfer (mo). Cleveland. Golf.
Collyer's Eye and Baseball World (weekly). Chicago. Sports and finance.
Dog World (mo). Chicago. Dogs (professional and technical).
Everygirl (mo). Grand Rapids, Michigan. Camp fire girls.
Field and Stream (mo). New York. Sports (especially hunting and fishing).
Fur Farming and Trapping (mo.) Woodland, Michigan. Technical and professional trapping and raising fur bearers.
Fur—Fish Game (Harding's Magazine). (mo). Columbus, Ohio.
Game Breeder (mo). New York. Breeding and conservation of game.
Golf and Sports Illustrated (mo). Montreal. Golf and general sports.
Golfdom, The Business Journal of Golf (mo). Chicago. Golf club and shop management.
Golf Illustrated (mo). New York. Golf.
Grit and Steel (mo). Gaffney, South Carolina. Game fowl.
Handbook for Boys (2 or 3 times per year). New York. Boy scouts.
Hiker (mo). Athens, Pennsylvania. Hiking.
Horse (bi-mo). Washington, D.C. Horses and mounted sports.
Horse and Jockey (mo). Chicago. Horse racing.
Horseman and Fair World (weekly). Indianapolis. Trotting horses and county fairs.
Horseshoe World, The Pitchers' Journal (mo). Horseshoe pitching.
Hounds and Hunting (mo). Decatur, Illinois. Hound dogs and hunting.
Hunter—Trader—Trapper (mo). Columbus, Ohio. Trade and sport.
Hunting and Fishing (mo). Boston. Hunting and fishing.
Illustrated Boxing Record (semi-mo). New York. Boxing.
Illustrated Canadian Forest and Outdoors (mo). Montreal. Magazine Subject Index. Forest conservation, outdoor life, and recreation.
Journal of Health and Physical Education (mo). Ann Arbor, Michigan. Education Index, Quarterly Cumulative Index Medicus. Physical education, health, and recreation.
Journal of Physical Education (September, November, January, March, and June). New York. Physical education.
Metropolitan Sportsman (mo). Newark. Sports.
National Geographic Magazine (mo). Washington, D.C. Magazine Subject Index, Readers' Guide. Travel, science, conservation, outdoor life.
National Greenskeeper (mo). Cleveland. Golf course care and construction.
National Sportsman (mo). Boston. Sports.
National Waltonian (bi-mo). Chicago. Izaak Walton League, outdoor life.
Northern Sportsman (mo). Munising, Michigan. Outdoor sports.
Northwest Hardware Trade and Sporting Goods News (mo). St. Paul. Hardware and sporting goods news.
Olympian (mo). San Francisco. Sports and club affairs.
Outdoor Life (mo). Mt. Morris, Illinois. Outdoor life.
Ozark Life Outdoors (mo). St. Louis. Outdoor life.
Pacific Coast Golfer (mo). Seattle. Golf.
Pacific Hardware Journal (mo). San Francisco. Hardware and sporting goods news.
Pacific Sportsman (mo). San Francisco. Hunting, fishing, and boating.
Pennsylvania Sportsman (quarterly). Wilkes-Barre, Pennsylvania. Hunting and fishing.

Polo (mo). New York. Polo and mounted sports.
Press (weekly). New York. Horse racing.
Professional Golfer of America (mo). New York. Golf professional.
Racing Form (daily, except Monday). Chicago. Horse racing.
Recreation (mo). New York. Readers' Guide, P.A.I.S. Play and recreation.
Red Ranger (mo). Rushville, Missouri. Fox hunting.
Rider and Driver (fortnightly). New York. Horses and horse racing.
Ring, The (mo). New York. Boxing and wrestling.
Rod and Gun and Canadian Silver Fox News (mo). Montreal. Sports, outdoor life, fur farming.
Rudder (mo). New York. Engineering Index. Yachting.
Saddle and Bridle (mo). St. Louis. Horse breeding and shows.
Scholastic Coach (mo. except June, July, and August). Pittsburgh. High and prep school coaching.
Scouting (mo). New York. Boy scouts.
Skating (4 times during winter months). Boston. Figure skating and skating.
Soccer Star (weekly, except during summer months). New York. Soccer.
Sport (mo). Philadelphia. Amateur sport.
Sporting Goods Dealer (mo.) St. Louis. Sport equipment and dealers.
Sporting Goods Journal (mo). Chicago. Sporting goods and trade.
Sporting News (weekly). St. Louis. Baseball.
Sporting News (weekly). Winnipeg, Manitoba. Sports.
Sports Afield and Trails of the Northwoods (mo). Minneapolis. Outdoor sports.
Sportsman (mo). Boston. Amateur sports.
Sportsman's Digest (mo). Cincinnati. Hunting, trapping, and fishing.
Sportsman's Review (weekly). Cincinnati. Trap shooting.
Sportswoman (mo. except July and August). Philadelphia. Sports (feminine interests mainly).
Spur, The (mo). New York. Society and sport.
Sun Set Magazine (mo). San Francisco. International Index. Outdoor life.
Swimmer (mo). New York. Swimming.
Thoroughbred Record (weekly). Lexington, Kentucky. Horses and horse breeding.
Town and Country (semi-mo). New York. Society and sports.
Travel (mo). New York. Readers' Guide, Magazine Subject Index. Travel and outdoor life.
Trotter and Pacer (weekly). Flushing, New York. Trotting horses and racing.
Turf and Sport Digest (mo). Baltimore. Horse racing and sports.
Uncle Jake Sports News (weekly). Dallas, Texas. Sports.
U.S.R.A. Bulletin (bi-mo). Springfield, Massachusetts. Pistol shooting.
Water Sports (mo). Chicago. Canoeing.
Western Out-of-Doors (mo). Portland, Oregon. Hunting, fishing, and wild game.
Western Sporting Goods Review (mo). San Francisco. Sporting goods and dealers.
Winged Foot (mo). New York. New York Athletic Club and sports.
Winter Sports (mo). New York. Winter sports.
Yachting (mo). New York. Yachting and sailing.
Ye Sylvan Archer (mo). Corvallis, Oregon. Archery.

III

SUGGESTED LIST FOR SMALL LIBRARIES

The small library, of necessity, must be extremely careful in its choice of titles for purchase. Only those items for which there is real need can be bought on the limited funds available. As most small-library librarians are not qualified for the task of choosing in the fields of sports and recreations, it does not seem out of place to make these suggestions.

Some fifty or more titles have been listed here as being of sufficient merit and value to be purchased by the small library. The titles aim to cover the field and with these as a basis on which to build, others may be added. In making the selections, such authoritative sources as the A.L.A. Catalogs, Standard Catalogs, and Booklist Books were consulted. The page reference refers to the main list where the book is more fully discussed.

Author	*Title*	*Page*
Adams.	*Harper's Outdoor Book For Boys*	132
Barbour and Sarra.	*Football Plays for Boys*	89
Barnes.	*Guide to Good Golf*	96
Beasley.	*How to Play Tennis*	100
Buck and Anthony.	*Bring 'em Back Alive, or Wild Cargo*	123
Calahan.	*Learning to Sail; also, Learning to Race*	136
Camp.	*Book of Sports and Games*	82
———.	*Football without a Coach*	89
Christy.	*Going Afoot*	138
Clark.	*Modern Ping-pong*	118
Claussen.	*Canoeing*	135
Corsan.	*Diving and Swimming Book*	107
Dalton.	*Swimming Scientifically Taught*	107
Elmer.	*Archery*	131
Feddersen.	*Deck Sports*	82
Frost and Wardlaw.	*Basketball and Indoor Baseball for Women*	87, 93
Frymir.	*Track and Field Athletics for Women*	94
Graham.	*The Girl's Camp*	133
Grey.	Any One or More of His on Hunting or Fishing	
Haughton.	*Football and How to Watch It*	91
Holden.	*Angling*	125
———.	*Streamcraft*	126
Jessup.	*Snow and Ice Sports*	142
Johnson.	*Lion*	124
Jones, R. T., and Keeler.	*Down the Fairway*	98
Jones. T. E.	*Track and Field*	94
Kephart.	*Camping and Woodcraft*	135
Krout.	*Annals of American Sport*	83
Laveaga.	*Volleyball*	119
Lunn.	*Skiing for Beginners*	143
McTaggart.	*Hints on Horsemanship*	141
Martin.	*Pictorial Golf*	96
Mathewson.	*Pitching in a Pinch*	87
Monk.	*Small-Boat Building for the Amateur*	137
Paret.	*Methods and Players of Modern Lawn Tennis*	101
Pope.	*Hunting with Bow and Arrow*	131
Post and Shirley.	*Selected Recreational Sports for Girls and Women*	84
Poulsen.	*Skiing*	143
Rockne.	*Coaching*	90
Roosevelt.	*African Game Trails*	124
———.	*Wilderness Hunter*	123
Rounsevelle.	*Archery Simplified*	131
Spalding's Athletic Library	(Ones for Minor Sports Particularly)	85
Stagg and Stout.	*Touchdown*	89
Tilden.	*Match Play and the Spin of the Ball*	100
Walton and Cotton.	*The Compleat Angler*	126

Wardlaw. *Fundamentals of Baseball* 87
——— and Morrison. *Basketball* 93
Warner. *"Pop" Warner's Book for Boys* 85
Wills. *Tennis* 102

IV
SUGGESTIONS FOR THE BOYS' AND GIRLS' DEPARTMENT

Two primary reasons why a library should emphasize sports and recreations are: to create interest in those physical activities which are wholesome and body building, and, far more important, to develop character and sportsmanship. It is the latter which is of most vital consideration in choosing books on these topics for boys and girls. Books stressing clean, fair play in competitive activities are much to be preferred to those merely telling about the sport. Character building must begin with youth and as most youths have an interest in sports and games, anything the library can do in the way of furnishing literature emphasizing this side should not be overlooked. Young boys and girls have their heroes. Thus, if a famous athlete says that fair play is best, they are far more likely to observe his attitude than that of a school teacher or even their parents, who may be much wiser but do not inspire this hero worship. This tendency on the part of boys and girls has been taken into consideration in the choice of material for this list, always, of course, considering the other qualities of the book as well. What greater champions of clean sport and clean living have there been than Walter Camp, Helen Wills, Glenna Collett, Dan Beard, Christy Mathewson, and "Pop" Warner?

Author — *Title* — *Page*

Adams. *Harper's Outdoor Book for Boys* 132
Barbour and Sarra. *Football Plays for Boys* 89
Beard. *Do It Yourself* 132
———. *Shelters, Shacks and Shanties* 134
Bonner. *Big Baseball Book for Boys* 86
Camp. *Book of Sports and Games* 82
Caulfield. *Skiing Turns* 142
Cheley. *Boys' Book of Camp Fires* 134
Claussen. *Canoeing* 135
Collett. *Golf for Young Players* 97
Decker. *Bows and Arrows for Boys* 131
Duff. *Bows and Arrows* 131
Harris. *Baseball* 87
Haughton. *Football and How to Watch It* 91
Horst. *Model Sail and Power Boats* 137
Jessup. *Boys' Book of Camp Life* 134
———. *Boys' Book of Canoeing* 136
———. *Snow and Ice Sports* 142
Kephart. *Camping and Woodcraft* 135
Lunn. *Skiing for Beginners* 143
Mathewson. *Pitching in a Pinch* 87
Ouimet. *Golf Facts for Young People* 97
Sandys. *Trapper "Jim"* 131
Warner. *"Pop" Warner's Book for Boys* 85
Washburn. *Among the Alps with Bradford* 139

V

BIBLIOGRAPHIES CONSULTED

The following is by no means a complete list of bibliographies or reading lists which have been published on the subject of sports and recreations. It merely represents those lists which the compiler examined and found useful; it could easily come within the classification of sources; many book entries and annotations came from these lists. For the most part these lists comprise selections made by individual libraries from their own collection. For this reason they may be of local value largely, yet they may be used as a check in other libraries for comparative purposes. Bibliographies in books are not here listed; their notation in the book note in the body of this work indicates that they were consulted. The exclusion of many lists means that they were not available for the compiler to examine in this limited time. The brief annotations which are included will serve to indicate something of the scope of the list named.

A Group of Outdoor Sports. Minneapolis Public Library. July, 1923. Pam.

Nearly seventy titles on many different sports. Most of the books are of a general nature.

Books on Indoor and Outdoor Sports in the Milwaukee Public Library. Extension Department, Milwaukee Public School Board. 1926. Pam.

Covers a variety of sports including baseball, basketball, bowling, canoeing, curling, football, hiking, horseshoe pitching, ice hockey, ice skating, soccer, swimming, skiing, snow shoeing, tennis, track and field, and volleyball. Older books largely.

Books of Summer Sports and Pastimes. Chicago Public Library. June, 1905. Pam.

Covers eighteen sports besides some entries under the heading "Athletics." Of particular note are those under cricket, croquet, cycling, lacrosse, and polo where there is relatively little in print even now. For the other sports the majority of titles are not of great value today.

Books on the Out-of-Doors. East Chicago (Ind.) Public Library Quarterly Bulletin. April–June, 1929. v. 5, p. 9–10.

Popular books on camping, touring, hiking, fishing, golf, swimming, and tennis. Also a section on summer resort regions of interest to outdoor people.

California Mountains. Los Angeles Public Library Monthly Bulletin. May, 1921. v. 15, p. 10–11.

Most of the books deal with this particular section of the country, but it will interest the nature lover and the outdoor person. Brief annotations are given.

Camping. Minneapolis Public Library. 1923. Pam.

This annotated list is divided into camps and camping, aids to campers, and camping adventures.

DRURY, F. K. W. *College Life and College Sport.* Chicago: American Library Association, 1924. Pam.

Pages 20–25, under the heading recreations, deal with books on sports and college games.

Fishing. Chicago Public Library Book Bulletin. June, 1923. v. 13, p. 102.

A brief list, mostly of popular books but including a few technical titles.

Game of Golf. Chicago Public Library Book Bulletin. May, 1914. v. 4, p. 89–90.

A list of forty-two books, particularly for the amateur and novice. All of the titles are old.

Hobbies: Some Varieties, and Their Cultivation. Brooklyn, Pratt Institute Free Library Quarterly Booklist. Winter, 1925. Series 5, p. 39–45.

The subjects covered are angling, camping, golf, mountaineering, and walking.

HOIT, DORIS. *Books of General Interest for Today's Readers.* Chicago: American Library Association, 1933. Pam.

Assisting the A.L.A. in this work was the American Association for Adult Education and the United States Office of Education.

Thoroughly up-to-date. The sections of interest here are "Sports," p. 43–44 and "Biography," p. 14–15. The latter includes lives of sportsmen. Well annotated.

HORTON, MARION. *Out-of-Door Books.* Boston: Bookshop for Boys and Girls, 1918. Pam.

Many of the headings used fall outside of this particular field but nearly all of the entries are of interest to the general subject, sports and recreations. There are some older books on hunting under the heading *Animals.* Annotated.

In the Mountains. Chicago Public Library Book Bulletin, June, 1923. v. 6, p. 107.

A short list of good reading on mountain life and mountaineering.

JAMES, H. C. *Select Annotated Bibliography on Canoe Trips, Horseback Trips, and Walking Trips.* Bulletin of Bibliography, Sept., 1926–Dec., 1927, May–Aug., 1928. v. 13, nos. 1, 2, 3, 4, and 6.

Appearing in five parts, this is an excellent list of book and periodical literature on the subjects covered. The arrangement under each of the three major heads is geographical by the area treated.

JEFFERS, LEROY. *Selected List of Books on Mountaineering.* Rev. ed. 1916. New York Public Library. Pam.

An excellent list adequately covering this subject up to 1916. Foreign as well as American books are included. The compiler was Librarian of the American Alpine Club at the time of this work. 46 pages.

JOHNSON, J. E. comp. *Interscholastic Athletics* (Reference shelf, v. 6, no. 2). New York: H. W. Wilson Co., 1929. $.90.

Debate material for school use. Has briefs and outlines.

MCCLOY, C. H. *Bibliography of Health and Physical Education.* Ann Arbor, Mich.: American Physical Education Association, 1932. $.35.

Reprinted from the RESEARCH QUARTERLY of October, 1932.

An extensive list, covering books and pamphlets up to the end of 1931. The arrangement is by subject. Nearly 2,500 entries. Has no index and is not annotated.

Out-of-Door Books. Los Angeles Public Library Monthly Bulletin, June, 1920. v. 14, p. 158–161.

Portions of this list are outside our immediate field. Those dealing with camp craft, cruising and sailing, fishing, mountain climbing, and tramping are of use. Briefly annotated.

Outdoor Hobbies. Detroit Public Library Library Service, Mar., 1930. v. 13, no. 6.

Of particular note is the list of periodicals. Covers fishing and swimming, boating, walking and climbing, camps and camping, and one or two general headings.

Outdoor Sports. Springfield, Mass.: The City Library Association, 1919. Pam.

Includes baseball, boating, camera hunting, camping, fishing, football, general, golf, hockey, hunting, motorcycling, mountaineering, skating, swimming, tennis, tramping; a section of titles "on keeping fit"; and a short list of periodicals.

RUSSELL SAGE FOUNDATION. *Recreation Bibliography.* Rev. and enl. ed. New York: The Foundation, 1920. $.30. Pam.

Has been revised several times. Most of the titles are rather old. The choice was good which makes it useful. Many of the headings are not within the scope of this compilation.

Spalding Baseball Collection, The. New York Public Library Bulletin, Feb., 1922. v. 26, p. 86–127.

Reprinted by the New York Public Library in pamphlet form in March, 1922, $.20.

This lists the titles of books, pamphlets, pictures, and other material which was included in the Albert G. Spalding library. Most of the books and material relate to baseball, but many other sports were included in this famous collection, now the property of the New York Public Library.

Summer Sports and Recreations. Coventry (Eng.) Public Libraries Bookshelf, May–June, 1933. v. 11, p. 55–61.

An excellent list of more than a hundred titles, well annotated, covering the following sports: bowling, tennis, golf, cricket, athletics, walking, mountaineering, camping, boating, swimming, and angling. Many of the titles are English, but most of them are available in this country.

Winter Games and Sports. Coventry (Eng.) Public Libraries Bookshelf, Nov.–Dec., 1932. v. 10, p. 135–138.

Mostly English books dealing with association football, rugby football, golf, hockey (field), ice and snow sports, table tennis, and badminton.

WOODRING, M. N., and SCHWENDENER, NORMA. *Enriched Teaching of Physical Education in the High School.* New York: Teachers College, Columbia University, 1929. $1.50.

"A source book for teachers of physical education, camp councilors, and recreation leaders, listing chiefly free and low cost illustrative and supplementary materials." *Title page.*

This goes far beyond the scope covered in the present work, but has so much valuable material that any library will find it useful. The arrangement is by large subject, with subdivisions, and the entries are under title rather than author. Well annotated. There is an index to subjects, but no author index.

BOOK REVIEWS

MENTAL HYGIENE OF THE SCHOOL CHILD. Percival M. Symonds, Ph.D. (The Macmillan Company, 1934) 321 pages. $2.25.

Professor Symonds has given us an unusually interesting study. Its lucidity is admirable. The book appeals to leaders—parents and teachers (substitute parents)—and aids them in diagnosing some of the abnormal actions and habits of our children.

Suggestions for the guidance of growing, imitative youth are based on common sense and tested techniques. The well-organized chapters deal with social behavior, case studies, drives and remedial treatment for the atypical.

After discussing the importance of mental hygiene in a school program, Dr. Symonds suggests certain principles conducive to the development of sound mental health.

The teacher's part in a mental hygiene program is brought out effectively. Some high points are:

1. Do you see yourself and your task objectively?
2. Do you use the children in your class to supply your own needs or, do you bring out the best that is in them?
3. Do you overtalk, preach, or complain?
4. Do you allow your children to do things by themselves even though they make mistakes?
5. Do you make your standards so high that children can not meet them?
6. Do you make contact with the child's innerself?

Under the heading of an "Analysis of Behavior Patterns" these points are of special interest:

1. Why are pupils always concerned about extraneous matters (show a tendency to be doing something other than the job on hand)?
2. Why are pupils constantly restless in study and easily distracted?
3. Why do pupils show meticulous interest in details?
4. Why do pupils display exaggerated courtesy and undue honesty?
5. Why do pupils show a tendency to solitariness?

Another chapter deals with some positive habits of mental hygiene that children should acquire and learn. A few outstanding ones (perhaps "teacher" or "parent" may be substituted for "child") are:

1. A child should learn to be helpful to others.
2. A child should learn to accept criticism without undue emotion.
3. A child should acquire a sense of humor.
4. A child should learn to reject habitual standards in favor of more intelligent standards.
5. A child should learn to face facts, accept facts, and act on facts.

In the light of what has preceded, *Mental Hygiene of the School Child* should prove of invaluable aid to subject and supervising teachers seeking practical hints on the mental behavior of the school child.

M. DONALD ADOLPH
Teacher of Health Education, Thomas Jefferson High School, New York, N. Y.

THE ADMINISTRATION OF HEALTH AND PHYSICAL EDUCATION IN NEW YORK STATE. Hiram A. Jones. (Teachers College, Columbia University, New York City, 1934) 155 pages.

Dr. Jones presents in this study the trends in the administration of the health and physical education program in the State Department of New York. He also determines their significance.

New York has no predecessor to follow in the organization of its health and physical education program. Its program has developed during the greater portion of its progress mainly by the trial-and-error method. The evolution of the program has been determined not only by the statutes enacted by the State Legislature, but also by the Board of Regents whose recommendations and decisions "carry the force of law." It was not until 1928 that the Board of Regents created a Division of Health and Physical Education.

The present health and physical education program in New York State has three major divisions, i.e., health protection, health teaching, and physical education. Dr. Jones summarizes the trends in each of these divisions.

The earliest phase of health protection in New York was chiefly concerned with vaccination, quarantine, and isolation—public health activities. These activities were introduced in the middle of the nineteenth century. Since its origin with these few meager activities, health protection has become a program which includes the examination and inspection of all pupils as an educative and preventive measure; follow-up, preventive and reparative services, communicable disease control, accident prevention, first-aid services, special school adjustments, mental hygiene, building sanitation, etc.,—a comprehensive and positive program. The responsibility for medical inspection has become that of the health and physical education program rather than the responsibility of the Public Health Department. The Medical Inspection Bureau had in 1932 a personnel of 10 persons with aggregate salaries amounting to $41,400. In 1915 there was 1 member of the Bureau who had a salary of $4,000. The effectiveness of the Medical Inspection Bureau may be indicated by the fact that in 1916-1917, 24.6 per cent of all ascertained defects were treated and corrected by this bureau while in 1931-1932, 48.2 per cent were treated and corrected.

Health teaching in New York began with the teaching of hygiene and physiology. A mandate in 1884 required that instruction in these subjects be provided for all students in the public schools. A new law enacted in 1896 and amended in 1906 provides the present legal basis for the teaching of hygiene and physiology in the public schools. The main objective is and always has been to instruct pupils as to the dangerous effects of narcotics, alcoholics, and stimulants on the human body. The apparent legal limitations have not prevented health teaching in New York State from widening its scope to include at present the formation of wholesome health habits, skills, knowledges, and attitudes of personal and community health. The program is directed toward a better way of living; thus it permeates and is integrated throughout the school curriculum. Two members form the personnel of the present Health Teaching Bureau which, until 1930, was administered under the Medical Inspection Bureau.

The state program in physical education was adopted in 1916. Buffalo, Syracuse, Brooklyn, Rochester, and New York City had types of physical education programs as early as the latter part of the last century. From a dominantly militaristic objective characterized by formal instruction, chiefly in calisthenics, New York state has come to think of physical education as a method of education to meet the individual needs of the pupils in health, social efficiency and culture. The Military Training Commission prior to 1921 greatly influenced the program in the state. State school officials now exercise freedom in the formulation of policies for physical education. Intramural sports, games, and supervised play have superseded the earlier limitations of the program in respect to interscholastic activities and formalized content.

The author has presented completely the legal bases for each phase of the health and physical education program. From his research, Dr. Jones offers a proposed organization of the health and physical education division.

This book should be especially help-

ful to administrators and students in administration of health and physical education throughout the country. Teachers of health and physical education in the state of New York should find time to read and study this excellent contribution to their field.

Ross L. ALLEN
Washington High School, Rochester, New York.

THE ADMINISTRATION OF HEALTH AND PHYSICAL EDUCATION. Jesse Feiring Williams, M.D., and Clifford Lee Brownell, Ph.D. (W. B. Saunders Co., 1934) 598 pages. $3.00.

The Administration of Health and Physical Education, written by Drs. Jesse Feiring Williams and Clifford Lee Brownell of Teachers College, Columbia University, and published by the W. B. Saunders Company of Philadelphia and London, is an excellent addition to the ever increasing list of texts dealing with the proper organization, administration, and conduct of health work and physical activities.

The authors believe "That this book will be of assistance in solving the multitude of problems confronting the administrators of health and physical education in public schools."

The book is well written and unusually informative on the subject of the administration of health and physical education programs. Particularly commendable are the questions for study and discussion to be found at the end of each chapter. In addition, the diagrams, tables, outlines, etc. to be found all through the book are an invaluable aid in aiding the reader to understand many of the points set forth. Some of the more important subjects which receive detailed and specific consideration are: The Meaning of Health and Physical Education; Basic Principles for the Administration of Health and Physical Education; Legal Aspects of the Administration of Health and Physical Education; Health Service; Health Instruction; Personnel and Functions of the Staff; Gymnasium Facilities and Equipment; Swimming Pools, Their Construction and Maintenance; The Care and Maintenance of Playground and Athletic Fields; Intramural and Interscholastic Athletics; Budget and Finance; Office Management.

Teachers of professional physical education students should find this book an excellent aid to guide their discussion in courses such as "Organization and Administration of Physical Education," "School Health Education," etc.

PAUL R. WASHKE
Professor of Physical Education, University of Oregon

SELECTED RECREATIONAL SPORTS FOR GIRLS AND WOMEN. Julia H. Post and Mabel J. Shirley (A. S. Barnes and Co., 1933) $2.00.

This well organized and carefully thought out book on eight recreational sports (since we cannot find a better word) should find a place in the library of many of the amateur small-space sportsmen who take their back yard and basement sports seriously enough to work on the technique of the sport. Certainly every physical educator who is working with adolescent girls or adult women should find the material included of real practical value.

In spite of the usual cries of distress regarding large groups in small spaces, most colleges and many secondary schools are including in their program those games which "require a small space, a small number of participants, and no specific skill" and which tend to have a more direct "carry-over" value for the student than other sports, meaning that students are apt to use these games in informal play after leaving school. This addition to the curriculum found the teachers with practically no material from which to teach, which was apparently the reason why Miss Post and Miss Shirley decided to write their book. In this reviewer's opinion, they have filled a need with *Selected Recreational Sports.*

Eight sports are thoroughly presented: deck tennis, horseshoe pitching, badminton, table tennis, shuffleboard, clock golf, paddle tennis, and tetherball. The presentation includes: a brief

history; a description of the situations in which the game can be played; a few rules; the equipment necessary; an outline of the desirable skills, illustrated with obviously posed pictures which dilute the really good analysis of technique; an outline of the strategy of the game; suggestions to players; teaching helps; and references.

After this comes a discussion of the methods of presenting these games in a recreational sports program. This reviewer agrees with the authors that these games should be "offered as a definite and separate course of instruction" but also thinks that they should be included as extra-curricular activities, with or without instruction, and that they should be used as "fillers" in rainy-day activities, etc.

The book winds up with an appendix of diagrams and lists of equipment and its sources. This is convenient and helpful, since all of the "set-up" material is included in compact form in the one chapter.

Altogether one of the most logically and clearly written technical books which we have read. Every physical education teacher who owns one will find that she has occasion to use it constantly.

JANE W. SHURMER
Instructor in the Department of Physical Education, University of Pittsburgh

FOLK DANCES AND SINGING GAMES. Elizabeth Burchenal (G. Schirmer, Inc., 1933) 83 pages. Board, $1.25. Cloth, $2.75.

DANCES OF THE PEOPLE. Elizabeth Burchenal (G. Schirmer, Inc., 1934) 78 pages. Board, $1.50. Cloth, $3.00.

A new revised edition of Elizabeth Burchenal's *Folk Dances and Singing Games* and *Dances of the People* which forms a second volume to it brings again to our notice these fine collections of carefully selected dances illustrating the choice contributions of many peoples of varying culture.

It seems but a short time ago that there was a very real danger of many of them disappearing under the changing conditions of modern life; and it is due to the efforts of pioneer individuals in the different countries, such as Miss Burchenal in this country, that they have now been collected and given wide circulation by such books as these.

The dances and songs here published have been part of the daily life in village and countryside for centuries, and it is only the breaking up of this life and the scattering and transplanting of the people to alien soil amid other conditions and with other standards of life that has threatened them.

These folk dances would consciously aim at beauty of movement as an end in itself, but the intrinsic beauty of some of the steps is a proof of their artistic quality.

One cannot get everything from printed descriptions, but these are so clear as to be almost equivalent to a living teacher.

The dances do not set out to cultivate the whole range of the muscular system, and in that sense their value in physical education is incidental, but it is very real through its discipline of rhythm, the stimulation of the music, and the exercise of the emotions along with the muscles. In this sense they form a most important part of any course for teachers.

Miss Burchenal is doing a great work for art and education in preserving and reviving folk dances. It seems almost needless to point out her outstanding qualifications for writing on this subject. Her travels in many lands, taking part in the dances herself with people who have always known them, her accurate recording and musical notation in the field, sometimes with the assistance of Emma Howells Burchenal (the musical arrangements are largely by her), all would make a story in itself. It is enough to say that Elizabeth Burchenal is the President of the American Folk Dance Society, represents the United States on the International Commission on Folk Arts, and is the author of a long series of books on her chosen subject. These two revised editions contain new illustrations

and material and include some of the cream of her researches.

R. TAIT MCKENZIE, M.D., LL.D., R.C.A.
Research Professor, University of Pennsylvania; President, The American Academy of Physical Education

THE AMERICAN COSTUME BOOK. Frances H. Haire (A. S. Barnes and Company) 164 pages. $5.00.

The general make-up of the book is pleasing and the content so interesting to read that it might well compete with books not so factual in nature. Miss Haire presents the facts in a colorful, historical manner that makes costume details seem logical and rightly a part of the people and the age in which each lived. This is particularly true of the section on American Indian costumes. This treatment of the subject should go far in correcting the erroneous idea that there is one costume suitable for all Indian types.

The manner in which authentic details are brought out is in itself a work of art. To suggest authenticity through simplicity of outline, wise selection of detail, and emphasis on the characteristic quality of each costume has been the illustrator's task so beautifully executed by Gertrude Moser. The illustrations are not photographic in detail as much as they are representations clearly focusing important details and subduing the lesser elements to the clarification of the whole.

The explanations for pattern making are clearly developed in a conversational style that makes the intricate process of cutting and sewing seem plausible to the most intimidated amateur. The suggestions for suitable inexpensive materials are excellent and make the book invaluable from a practical point of view. The danger of reproducing quality with cheap materials is known to all amateur producers, and it is with great satisfaction that one can point to a practical guide that recommends the right thing for artistic authentic results.

The material covered includes The American Indian, Plains, Desert, Forest, Everglades, The Indian Scout, The Homesteader, The Puritan, and The Cavalier. The periods described and illustrated are early, middle, and late nineteenth century and the "Gay Nineties." There is no mention of the southern American negro.

If amateur directors of school productions would profit by Miss Haire's research and splendid costume suggestions a real contribution to the art of production will have been accomplished by the *American Costume Book*.

IONE M. JOHNSON
Department of Physical Education for Women, University of Illinois

MENTAL HYGIENE IN THE COMMUNITY. Clara Bassett. (Macmillan Co.) $3.50.

Characteristic of the present era is a keen interest in all things psychological. A possible reason for this interest is that man, after centuries of concentration on the objective world about him, has been able to mold the situation to his bidding, only to find that as a result of his serious ignorance of himself and his motives, and of his failures in controlling the worst human impulses, his world may crack down about his ears, with annihilation for him in the subsequent chaos. Now with the breathing space necessary for introspection and self-analysis, the very great prevalence of serious nervous and mental disorders has impressed him with the stern necessity of giving thought to these matters, for the individualized mind and personality are apparently a very late and fragile development in biological evolution, and for this reason seem to be particularly susceptible to mal-developments. Hence, there will always be the problem of the adjustment of human beings to themselves and the world at large with the maximum of personal and social effectiveness and satisfactions. All must agree with the author that mental hygiene is slowly emerging from the haze of conflict which envelopes the various schools of thought, toward a more effective instrument for the study, treatment, and

prevention of mental and behavior disorders.

The organizations which are now primarily concerned with the problems of mental health are many and varied, and as might be inferred from the title of the book, the author writes of the relationship of this field to the work of the physician, educator, minister, lawyer, nurse, social worker, club woman, member of parents' associations. Included are valuable lists of suggestions for the investigation of mental hygiene developments in connection with the work of such groups, in order that they may thoroughly study their local situation with regard to the adequacy of psychiatric services, and the extent to which the psychiatric approach is being utilized in the study and treatment of social problems and many other phases of the subject of mental hygiene. This book is to be highly recommended for its thorough treatment of the field with which it is concerned.

N. M. GRIER
Myerstown, Penna.

THE OLYMPIC COACH. Lawson Robertson and H. E. Sayger. (Sayger Sports Syndicate, 1934) 60 pages. $6.00.

Despite the great popularity of track and field athletics in this country during the past thirty years, there has been a great lack of authoritative written opinion concerning correct form in this sport.

When we consider that of the many track books in print, only three or four were written by nationally recognized coaches, the great need for this volume by Lawson Robertson of Pennsylvania and Olympic fame is self-evident. It is unfortunate indeed that those rapidly passing great coaches of the old school, men such as Keene Fitzpatrick of Princeton and the late Steve Farrell of Michigan, have not found it possible to put in print some of the wealth of methods they have tried and found wanting or of great value, only a small portion of which is now generally known or available.

Here in this volume, *The Olympic Coach,* such an attempt is made. Let us hope that it will act as a stimulus to Mr. Robertson and to other equally experienced track coaches toward further and more detailed information.

The book is of the looseleaf notebook style, contains sixty pages, eleven inches by sixteen inches in size, which so fold together as to form eight sheets. Two drawings about six inches in height are placed on each page so that a series of clearly outlined figures runs across both the top and bottom. This makes it possible, reading across an eight-foot chart, to actually see, as contrasted with being merely told, the evolution of a form from its first movements through completion.

Each figure is accompanied by appropriate comment which gives not only points to be stressed at that particular stage but general training procedure as well. It is unfortunate that greater emphasis was not placed upon these remarks. Any picture representing a single phase of a complex body movement is almost always deceiving as to what immediately preceded and as to just how such a position is to be attained in actual performance of the event. In the shot put, as illustration, the left shoulder inevitably moves to the left of the center line of the putting circle. Such movement is easily exaggerated however with a consequent loss of power. Unless a coach's attention has been called to this fact, a picture showing good form at this stage of the put, would give no indication of the danger. There are a great many such faults which pictures too few in number or too limited in additional explanation cannot bring out.

All events included on the collegiate track and field program are described. The shot put, discus and hammer throw, broad jump, pole vault, high and low hurdles, and the relay are each accorded a full series. The high jump with its two forms, the eastern and western, is analyzed twice while both the cross-step and hop styles are shown in the javelin throw. The 100 and 220, the 440 and 880, and the mile and two mile are paired and thus covered in three groups.

While of value to all men interested

in increasing their own knowledge of track and field athletics, this book should find its greatest use in the locker-room and on the field. To be able to show a needed point, is inferior in method only to actual demonstration of it.

Considering the size of the opened chart, the closed book, leather bound, makes up a practical and durable aid to coaching in a sport where such aids are all too few in number.

KEN DOHERTY
Assistant Track Coach,
University of Michigan

THE LEISURE HOURS OF 5000 PEOPLE—A REPORT OF A STUDY OF LEISURE-TIME ACTIVITIES AND DESIRES. (National Recreation Association, 1934). 83 pages. $1.00.

During 1933, the National Recreation Association conducted a survey, with the aim of answering three questions: (1) What are people doing in their spare time? (2) What recent changes have occurred in their leisure activity? (3) What would they as individuals really enjoy doing?

Questionnaires were answered by over five thousand men and women, married and single, employed and unemployed, in a variety of occupations, aged from sixteen to sixty-five, and living in twenty-nine cities and towns in ten states of the United States. On a list of thirty-seven home and fifty-seven outside recreational activities, they were asked to check if they took part in the activity (1) once in awhile, (2) often, (3) more than before, (4) less than before, and (5) if they would enjoy taking part in the activity.

In the answers, the ten activities in which most people recorded occasional participation were: reading magazines and newspapers, listening to radio, attending the movies, visiting or entertaining others, reading books (fiction), auto riding for pleasure, swimming, writing letters, reading books (non-fiction), conversation. The same list appears in slightly different order as the activities in which frequent participation is most frequently recorded: reading newspapers and magazines, listening to radio, reading books (fiction), conversation, reading books (non-fiction), auto riding for pleasure, visiting or entertaining others, attending the movies, swimming, and writing letters.

The ten activities showing the greatest net increase in participation are as follows: reading magazines and newspapers listening to radio, reading books (non-fiction), conversation, caring for home grounds, caring for flower garden, reading books (fiction), swimming, visiting or entertaining others, and serious study.

A fourth list gives the activities showing the greatest net decrease in participation: listening to the Victrola, ice skating, attending movies, attending legitimate theater, coasting, pool and billiards, indoor bowling, motor camping, attending amusement parks, and backyard games.

These lists might easily give a visitor from Mars the impression that we are a home-loving people, unsocial and sedentary in our habits. To get the other side of the picture, let us consider the list of the ten activities most often wished for by this same group—their unmet leisure-time desires: tennis, swimming, boating, golf, camping, caring for flower garden, playing musical instrument, auto riding for pleasure, attending legitimate theater, ice skating. This list shows the others in their true perspective, and completes the picture of today's recreation problem, when the average person is being restricted to inexpensive home activities, which are less satisfying in themselves, because of the scarcity and high cost of facilities for the sports and other activities they have learned, or because the community in which they live does not provide opportunity for participation in them.

Other interesting facts are brought out by this survey. It is shown that the first ten items on these lists vary but very little with age, sex, marital status, or employment, but that young people participate in more activities than older ones, single people in more than married ones, and men in more than women. The average person reports participation in

twelve home and thirteen outside activities, and frequent participation in eleven activities. Part-time employed people participate in more activities than full-time or occasionally employed people. The unemployed group shows the lowest participation in activities.

This survey should be studied by everyone who is concerned with the problems of community recreation. The situation it reveals is a challenge to every community and every organization to provide adequate recreational opportunities for all.

ELIZABETH NOYES
Assistant to the Editor, Journal of Health and Physical Education

PHYSICAL DEFECTS: THE PATHWAY TO CORRECTION. (American Child Health Association, 1934). 171 pages. $1.00 paper, $1.25 cloth.

I want to recommend to all physical educators directly concerned with promotion of a health program the recent monograph *Physical Defects—The Pathway to Correction* published by the American Child Health Association in 1934.

The original committee responsible for this survey represented the Departments of Education and Health of New York City, the New York Tuberculosis and Health Association, and the Metropolitan Life Insurance Company.

In this monograph the efficacy of the diagnosis and follow-up of certain defects, notably visual, dental, hearing, nutrition, diseased tonsils, pediculosis, and health education, are analyzed. The fact that the diagnosis of a particular defect does not take into account the severity of the condition and its need for correction is brought out in the discussion and reënforced by charts. This lack of discrimination at the time of the examination leads to very unsatisfactory follow-up and correction. As a result of the indiscriminate advice which follows all such inspection and examination, the committee reporting has set up very specific criteria that should increase a hundredfold the effectiveness of any examining program.

The final critique in regard to diagnosis of septic tonsils and the question of their removal and the discussion in regard to the indiscriminate diagnosis of dental conditions reënforce facts with which all of us are familiar.

This is a very impressive study, constructive and practical. The simplicity of its form and its brevity enhance its value. Critical discussions and suggestions are included throughout the book and reënforced in the general summary. Each chart is used to advantage.

DR. MARGARET BELL
Department of Physical Education for Women, University of Michigan

THE SPASTIC CHILD. Marguerite K. Fischel. (C. V. Mosby Company, 1934).

In her little book, *The Spastic Child*, Mrs. Fischel has offered frank, informal, and personal testimony regarding the rehabilitation of certain "spastic" children—her own two sons. Since, until very recently, few institutions have been equipped with facilities or personnel for successfully handling the development of birth injured or prenatally injured children, the task of adjusting a disorganized muscular control in these two cases fell to their mother.

Mrs. Fischel appears to have been well qualified for her task. Her book shows that she has tried to acquaint herself with the etiology of such cases and with the various methods used in orthopedics and physical therapy. She has been guided by excellent medical counsel.

Would that all parents of "spastic" children could realize with her "the necessity for preparing very early for the measures which must be taken in the treatment of Little's disease. A great deal of time can be saved in the less profoundly affected cases if irregularities in motor control are treated soon enough to prevent their becoming almost hopelessly grooved by habit. The use of massage and braces and other measures greatly help the severe cases and assist in preventing deformities that otherwise

offer serious complications later." Mrs. Fischel has emphasized, moreover, the most important psychological problems involved in such cases: the emotional instability induced by the fatigue from which all "spastic" children suffer; their awareness that they are attracting undue and unflattering attention to themselves; and their unfair mental rating because the play, social outlets, and schooling which serve to educate normal children are denied to them.

This little book should find its way into the hands of parents, nurses or physiotherapy aides, and students of corrective physical education, who have "spastic" children to serve. From its pages, parents will gain help for their important tasks; and, if they read between the lines, will discover some pitfalls to be avoided. While receiving renewed courage for their persistent efforts, they will recognize, in this day-by-day association, the dangers to their own as well as their child's nervous stability—dangers inherent in the parent-child relationship; and will discover how much of their burden can be assumed by a well trained, sympathetic, but less emotionally concerned physical therapist.

Physical therapists and students of corrective physical education who read *The Spastic Child* will find an excellent case report. The descriptions of Mrs. Fischel's methods in therapy are clear. She has considered relaxation, coordinations, balance and the erect postures, physical upkeep, speech, school work, play and sports, and occupational therapy. It is to be regretted that the one kinesiological problem which Mrs. Fischel discusses at length—that of proper development and use of the foot—is incorrectly blamed on the improper control of the tibialis anticus muscle. Fortunately the orthopedic and corrective measures used, however, were orthodox and apparently proved satisfactory.

The fear which Mrs. Fischel expresses in her conclusions that the methods used "may be in some ways unscientific" is unwarranted for the most part; and the book offers many suggestions which will be of service to other parents and to teachers of "spastic" children.

JOSEPHINE LANGWORTHY RATHBONE
Teachers College, Columbia University

PRACTICAL EVERYDAY CHEMISTRY. H. Bennett. (Chemical Publishing Co. of New York, 1934). 305 pages. $2.00.

This book contains the chemical formulae for an enormous number of practical substances. The average person interested in dabbling in chemistry, or in making some particular mixture, should be able to accomplish his desire by following these simple directions. The variety of materials treated is indicated by some of the chapter headings: adhesives; cosmetics and drugs; food products, beverages and flavors; lubricants; photography; soaps and cleaners.

Since this is purely a practical workbook, all theory has been omitted. A three-page introduction and some sets of tables supply sufficient information to clarify the formulae.

Teachers of physical education who are responsible for the upkeep of buildings and equipment, the developing of photographic plates, the prevention of infection and odors around showers, or the marking of lines and equipment should find this book very useful for consultation.

ELIZABETH NOYES
Assistant to the Editor, Journal of Health and Physical Education

List of Sustaining Members

American Physical Education Association

Whose contributions of ten dollars have largely made possible the publication of the Research Quarterly

Aldinger, A. K., M.D., Director of Health Educ., 157 E. 67th St., New York, N.Y.

Anderson, W. G., M.D., Box 1802, Yale Station, New Haven, Connecticut.

Athletic House, Ohio State University, Columbus, Ohio.

Baiderhase, Josephine, 176 W. 87th St., New York, New York.

Boier, Frank J., 6324 Laurel St., New Orleans, La.

Bezdek, Hugo, Dir. of P.E., Penna. State College, Pa.

Blanchard, V. S., Board of Education, 11526 Linwood Ave., Detroit, Michigan.

Boston University, School of Education, 29 Exeter, Boston, Mass.

Burns, Harry, M.D., Administration Bldg., Pittsburgh, Pa.

Elliott, E. S., Dept. of P. E., Columbia University, New York City, N. Y.

Fisher, Dr. George J., 2 Park Ave., New York, New York.

Gianquo, C. D., George Williams College, Chicago, Ill.

Health Education Dept., Att'n: W. H. Andrews, Boys High School, Marcy & Putnam Aves., Brooklyn, New York.

Hermann, Ernst, 6 Everett St., % Sargent School, Cambridge, Massachusetts.

Huff, George, Director, School of Phys. Education, Univ. of Illinois, Urbana, Illinois.

Langton, Dr. Clair V., Dean, School of Health and Phys. Educ., Oregon State Agricultural College, Corvallis, Oregon.

Lee, Joseph, 101 Tremont St., Boston, Mass.

Lee, Mabel, University of Nebraska, Lincoln, Nebraska.

Luehring, F. W., 435 Riverview Rd., Swarthmore, Pa.

Marvel, Fred W., Brown University, Providence, Rhode Island.

McCurdy, J. H., M.D., 93 Westland Ave., Springfield, Massachusetts.

McGill University, Att'n: Dr. A. S. Lamb, Dept. of Phys. Educ., 3484 University St., Montreal, Quebec, Canada.

McKenzie, R. Tait, M.D., 33rd and Spruce Sts., University of Pennsylvania, Philadelphia, Penna.

Meanwell, T. N., Dir. of Athletics, University of Chicago, Chicago, Ill.

Mitchell, E. D., Director, Intramural Sports Building, Ann Arbor, Michigan.

Moulton, Gertrude E., M.D., Talcott Hall, Oberlin, Ohio.

Norris, Dr. J. Anna, 1429 E. River Road, Minneapolis, Minn.

Posse-Nissen College of Physical Education & Hygiene, 139 Glenwood Ave., East Orange, New Jersey.

Purvis, Ethel, American Child Health Assoc., 50 W. 50th St., New York, N. Y.

Preuch, Frederick, Dir. of P.E., Temple Univ., Philadelphia, Pa.

Rockwell, Ethel, 226 Douglas Ave., Kalamazoo, Mich.

Saunders, W. B., Co., Att'n: W. L. Saunders, W. Washington Square, Philadelphia, Pa.

Seibel, Hugo R., 33 Clark Lane, Waltham, Massachusetts.

Stafford, Grace M., Ass't to Director of P. E. Gary Public Schools, Gary, Ind.

Straub, William K., Dir. of Phys. Educ., Board of Educ., Cincinnati, Ohio.

Swain, Leslie E., Brown University, Providence, Rhode Island.

SPRINGFIELD COLLEGE

Corporate Title
INTERNATIONAL Y.M.C.A. COLLEGE

Springfield, Massachusetts

GRADUATE DEPARTMENT (Men—Women)

Requirements for Entrance

Good character; Proven ability as a teacher of experience; Graduation from approved Bachelor's Degree course.

Students from regular Science courses ordinarily require two years.

Students from four-year professional courses may reduce the required hours depending upon the character of their work.

Requirements for Graduation

Completion of 31 semester hours of work on the graduate level in addition to the amount of undergraduate professional requirements. Courses offered include:

Physical Education Seminar: Covering advanced and original work.

Character Education: Discussions and examination of the literature.

Experimental Physiology: General Survey with selection of individual topic

Experimental Physics: Study particularly of Physics in relation to animal

Thesis: An experimental study of some essential topic.

Recreation and leisure time leadership.

48 Students in Graduate Division of Summer School for 1934.

33 Graduate Students during year, 1934-35.

240 Students in undergraduate department during the current year.

GEORGE B. AFFLECK, A.M., M.P.E., *Director*

CHARLES W. BERRY, M.P.E., Ed.D., *Chairman Graduate Council*

JOSEPH D. BROCK, M.Ed., *Secretary*

Write to the secretary for Printed Matter and Application Blank

ICAL LIBRARY

APR 4 - 19

Supplement to The

Research Quarte

of the

American Physical Educ

Volume VI March, 19

Studies in Physical Educatio

Sponsored by the Sch of Ed

of Boston Un ersity

Published March, May, Oc and December

Address: 311 Maynard, Ann Arbor, Michigan Subscription

STUDIES IN PHYSICAL EDUCATION

Sponsored by

THE SCHOOL OF EDUCATION

of

BOSTON UNIVERSITY

Edited by

Frederick Rand Rogers

"Whatever your goal may be, strike out for it! What if you die in the attempt? Well, if you put every shred of yourself into the attempt, you will have had life's one great exhilarating and soul-satisfying experience anyhow. And when you start out to pursue your dreams, be prepared for a great discovery. It is the effort itself that will give you peace. This peace goes with you as you grow older, becomes your choicest companion, never leaves you. Wresting this peace from a troubled world is about all there is to the secret of happiness."

—Ralph Waldo Emerson

The American Physical Education Association

March, 1935, Supplement to *The Research Quarterly*

1935

PREFACE

In general, measurement in physical education is rapidly leaving a lusty infancy to become almost youthful, but on the same scale tests of muscular power are full-grown. Since these are involved in most of the studies of this symposium, a special note is in order here concerning them. Beginning in the dark ages with "feel my muscle!" as significant tests of physical power, strength tests have passed through many stages, including particularly that brief era inspired by Dudley Allen Sargent —for whom they should be named, if any name deserves that distinction. . . . The present writer was first introduced to the "Harvard Strength Tests" in 1911, and began experimenting with them in 1920. His Ph.D. dissertation, standardizing, validating, norming, and proposing educational uses for strength tests, was completed in 1925, but it was not until 1927 that New York State schools began redirecting their programs in accordance with physical fitness test results. In 1934, the writer summarized in *Recent Strength-Testing Literature* some 25 studies printed between 1925 and 1934; and lo! already another score are offered to a cautious but sanguine profession. Strength-testing techniques and dependent educational procedures are no longer in their swaddling clothes!

* * * *

Readers will note wide variations in the style, content, and thoroughness of the studies included in this symposium. This is to be desired rather than otherwise. It makes for readableness, interest, the exorcism of a tedious scholasticism. But let hasty critics be forewarned: the conclusions from even the most cursory report may be modified, but they are not likely to be reversed by more thorough research. For there is a buttressing, a reinforcing, of each study by so many others that the bundle has almost become a rod.

* * * *

The authors and editor are indebted to the American Physical Education Association, to President Daniel L. Marsh of Boston University, to Dean Arthur H. Wilde of the School of Education of Boston University, and to a few selected advertisers for the privilege of, and encouragement and support in, presenting the studies of this Supplement to a progressive group of physical educators. May their earthly joys be multiplied, and their satisfaction in our efforts equal our gratitude for their assistance.

* * * *

Just half of the studies included in this symposium originated in Boston. It has been our desire to bring together the most pertinent and practically useful documents available, no matter what their source. We regret only that lack of time and space prevented us from adding others to the list.

* * * *

Must we explain the enthusiasm of our authors? Must they answer again to the gentle reproach, "The lady doth protest too much?"

But if their cause is worthy and their conclusions sound—***why not?***

Boston, February 16, 1935

F. R. R.

CONTENTS

PART I

Measurements: Tools and Criticisms

Tests and Measurements in Physical Education. *W. W. H. Mustaine* 7

Calibration and Uses of Fitness Tests in Westmount High School, Quebec. *Kenneth H. Murray* 12

The Validity of Various Tests as Measures of Motor Ability. *Elizabeth B. Wellman* 19

The Selection of Physical Tests for Measuring Y.M.C.A. Secretaries. *V. F. Hernlund* 26

An Experiment in the Psychology of Competition. *Harold L. Berridge* 37

A Comparative Study of Three Methods of Measuring Flat and Weak Feet. *Harold R. Danford* 43

Advantages of a New Shadow-Silhouettograph over the Original. *C. H. Hubbard* 50

Methods of Procedure in the City Comprehensive School Health and Physical Education Surveys. *John M. Harmon* 54

The Backboard Test of Tennis Ability. *Joanna Thayer Dyer* 63

PART II

Programs for the Conservation of Physical Powers

Saga: Redirecting Physical Education in a City High School. *Carl G. Chamberlain* 77

The Lynbrook Physical Education Program. *James J. Carter* 84

Notes on "D" Classes. *B. North Parsons and Harold W. Herkimer* 95

Meeting the Individual Physical Needs of Girls in Junior and Senior High Schools. *Helen M. Chesky* 102

Melrose High School Experiments. *Leonard Clark* 111

The Measurement and Reporting of Results of Corrective and Developmental Physical Education. *William H. Whiting* 116

Effects of Various Physical Activities on the Physical Fitness of University Men. *Donald H. MacKenzie* 125

The Effects of Various Summer Programs on Boys' Physical Fitness. *Arthur L. Jones* 144

Measurement of Physical Fitness at Camp Brooklyn. *J. Wayne Wrightstone* ... 150

A Program of Measurement in Health for Boy Scout Summer Camps. *James A. Wylie* 156

Meeting Individual Health Needs in a Y.M.C.A. Boys' Camp. *John B. Malcolm* 166

PART III

Equating Opponents in Sports

The Doctrine of Equality. *Frederick Rand Rogers* 189

Equalizing the Abilities of Intramural Teams in a Small High School. *H. Harrison Clarke and Harold A. Bonesteel* 193

Strength Testing Program Applied to Y.M.C.A. Organization and Administration. *Harry Gordon Oestreich* 197

Equating Opponents in Junior High School Activities. *Walter A. Cox and Kenneth B. DuBois* 202

Equating Opponents in Junior High School Track and Field Events. *Albany Physical Education Staff* 203

Equating Opponents in Swimming. *Albany Physical Education Staff* 209

Equating Opponents in Skating. *Albany Physical Education Staff* 212

Equating Opponents in Intramural Track and Field Activities. *Albany Physical Education Staff* 219

PART IV

Omnibus

Is Physical Fitness Testing Adaptable to Y.M.C.A. Physical Education Programs? *Robert E. Laveaga* 229

Evaluation of Certain Phases of a Junior College Physical Education Program. *V. F. Hernlund and N. G. Barfield* 235

Uses of the Physical Fitness Test Battery in the Personnel Department of an Industrial Plant. *Harry G. Oestreich* 242

Case Studies of Unusual Physical Fitness Indices. *Elizabeth Zimmerli* 244

The Relationship of Certain Sociological Factors to P.F.I. Tests in a Specific Rural Environment. *Harold K. Jack* 250

A Study of the Effects of Two Diets on Physical Powers. *L. Charles Rosenberg, M.D., and Frederick Rand Rogers* 257

The Relation Between Physical Fitness and "Success" in Physical Education Activities. *Bessie L. Park* 263

An Inquiry into the Correlation between Physical Fitness and Scholastic Standing. *Charles D. Giauque* 269

The Ankle Lever and Its Classification. *F. H. Pratt, M.D.* 276

Personalities and Performances 280

PRELUDE

SYMPATHETIC readers of this symposium may, if they attend closely, hear strains as of music in its essays and reports. For these studies outline philosophies or explain theories or report experiments whose purposes are to promote health and happiness, social character and joy, culture and appreciations of the world-around. Indeed, the editor might as well confess at once that this particular offspring of the printing press—which disgorges ugly ducklings and swans with equal disdain for their intrinsic worth or the favor of multitudes—was conceived and organized in the spirit and form of an educational symphony.

An "unfinished" symphony, perhaps, though bearing no resemblance to Schubert's great work. Unfinished because so many of its studies barely suggest themes which cry out to be completed; because too few experimental cases are involved to give authority to conclusions; and because of repetitions which that inexorable tyrant Time prevented us from eradicating from the score. But educational music still, in form and content; harmonies and melodies repeated again and again but always with illuminating variations and comprehensive codas; disharmonies here and there as improper educational practices or measuring devices are exposed or criticized; climaxes in all-convincing research reports following the announcement of themes by less ambitious but even more revealing studies—because in their simplicity we hear the motif even more clearly.

* * * *

Part I of our modest educational symphony—the "first movement" —announces at once the main theme: we are concerned chiefly with measurements in physical education, measurements of immediate and real value, measurements which relate to and assist in achieving educational objectives—measurement creation, improvement, criticism, and use. This movement is, as it should be, varied in tempo and subject; incomplete; confusing in parts; needing to be read over again and again to be understood; needing imagination properly to fill in the obvious gaps; but always the subject of measurement is evident. *Allegro ma non troppo* is the tempo.

Part II reports almost exclusively experiments in the improvement of physical fitness: *power, vitality!*—that quality of character from which all else flows. It is withal a restrained movement, full of harmony, rhythm, song. The theme is simple, infinitely repeated but growing in complexity through the long list of studies. There are two minor themes and climaxes: one for the guidance of children through school months; the other for their vacation months. Philosophers will read it *allegretto*, with smiling compassion, as Conrad says, for that great weakness which must be recognized with infinite compassion as the common inheritance

of us all. Perhaps some of them will hear cadences and strains of the second movement of César Franck's *Symphony in D Minor*. . . .

Part III is exciting, provocative, threatening, promising, challenging! "Why have you delayed so long to put your common philosophy to the test?" it demands. The first rule of good sportsmanship is fair play, equality between opponents. Shall we acknowledge it in deed as well as word? For it "works!" It can be made to function in practice! "Dare to be a Daniel!" it shouts; and promises joy to players and victory without exception to education's saints who live according to their words. Read it *allegro molto vivace*, and recall the third movement of Tschaikowsky's poignant *Sixth*.

Part IV is an unsatisfying closing movement, because so much remains to be said. Studies of pupil-freedom-with-responsibility ("player-control"), cultural development, the application of physical education measurements to industry and recreation, are still missing. So, also perhaps, are those finally-convincing studies which would confound the scoffers, melt the cynics, challenge the active interest of the indifferent; and win the unquestioned support of the open-minded, the active loyalty of well-wishers, and the undying fidelity of friends. We would that these studies were available now, so we might spread them before the reader with hosannas, in the spirit "what hath God wrought!" and claim artistic affinity with the tempo and triumphant glory of the final movement of Brahms' *C Minor* or Beethoven's immortal *Fifth*.

But the included studies are promises of such a future, in which physical educators' measurements, investigations, and philosophy will encompass human experience, needs, and hopes. Part IV closes with a rapid finale: a brief glimpse of the personalities and contributions of the authors, who have so generously favored the Association with their studies and so graciously honored the University by their participation in a truly amateur venture.

Part I

Measurements: Tools and Criticisms

"The problem of physical education is susceptible of precision. It should be attacked by every means that modern science has at its disposal. Whenever one takes pains to measure, ideas become clearer; to introduce a new instrument of measurement is to render a greater service to the cause than to form opinions or prejudices."

—G. Demeny.

Tests and Measurements in Physical Education*

By W. W. H. Mustaine

FIRST PRINCIPLES

IN THE field of physical education the comparatively recent work of Bovard, Cozens, Kleeberger, McCloy, McCurdy, Neilson, Rogers, Schneider, Wayman, and others attest to the present activity in test and measurement research. Physical education tests began with tests of strength and of abilities in the fundamental large-muscle activities such as running, jumping, climbing, throwing, and others—all of which are fundamental curricular materials in physical education and all of which have some practical value.

Inasmuch as practically all of the elementary, and most of the secondary, school programs are designed for general education rather than to prepare specifically for vocations, tests and measurements of achievement in curricular materials, simple or complex, are justifiable only to the extent that such achievement is significant in respect to the general educational outcomes for which elementary and secondary school programs are instituted.

It is obviously a useless procedure to conduct tests which contribute little or nothing toward desired goals. Many such tests have been proposed for use in mental as well as in physical education. Their relation to objectives is of a most tenuous character, and they even are preserved in our current literature long after they have been proved relatively unreliable and invalid. Measurement in physical education will have passed adolescence when tests are properly validated, and normed, and their all-round economy and utility demonstrated before being presented for general use.

Remember also, to use tests *as an aid* but not to rely on them exclusively or implicitly. It is a matter of common observation that pupils may excel in the school curriculum and yet fail to achieve the true objectives of education. Thus it is seen that in selecting tests in physical education we must first decide upon our educational objectives. We should then consider what tests and measurements may best promote their achievement.

Since class organization is one of the first things to be done by the administrator or teacher, tests which are fundamental to the proper grouping of pupils should be given first place. The tests used as a basis of class organization should be recognized and proved in practice to be sound and should have true educational significance. Inasmuch as cur-

* This résumé was adapted from an article of the same name in *The Cadat* of Phi Delta Pi, April, 1932.

ricular materials must be adjusted to the pupils, and not vice versa, it seems obvious that these initial tests should be for the purpose of determining pupil status and pupil needs.

It would seem to be a sensible approach to the problem of selection for each teacher or administrator to consider first just why he wants to give tests, what uses he expects to make of them, and whether such uses have sufficient educational or administrative value to justify the expenditure of the time and energy that the tests will require.

After answering these questions the teacher will be better prepared to select the tests that are needed. As a possible aid in solving the quandary, it is suggested here that tests and measurements in physical education are needed primarily (1) to determine the present status of individual pupils, on the basis of which (2) to classify pupils according to their capacities and needs, and that (3) in athletics, opposing teams may be equalized so that (4) we may better develop social attitudes—all so that (5) programs may be differentiated to meet individual pupil needs, and (6) appropriate standards in the field of greatest needs may be determined, whereby (7) a means of judging pupil progress toward educational objectives may be provided, and (8) the efficiency of teachers and the relative merits of different types of activity programs as well as the factors of time, equipment, and space, may be fairly and significantly evaluated, thus (9) winning greater respect and better support for our programs and ourselves, and (10) giving our records and reports more meaning.

THIS PHILOSOPHY AS APPLIED IN NEW YORK

With the considerations in mind which have been briefly outlined, it may be of interest to physical educators to learn how this testing philosophy has been applied in New York and, to some extent already, in Colorado, Minnesota, Massachusetts, California and a few other states. For convenience, and because of the writer's relation to the New York program, what follows will, with the reader's permission, be expressed in the "first person." This program has been in operation in a steadily increasing number of cities and villages of New York since 1927. It has definitely passed the experimental stage, and is incorporated as a vital and integral part of the new syllabi published in 1934 and 1935.

We in New York, in an effort to provide a logical basis upon which curricular materials, tests, methods, and all else connected with the State program may be rationally and defensibly determined, have accepted three general aims for our physical education programs. These are stated as *health, social efficiency,* and *culture.* They seem to constitute the least common denominators of practically all the objectives of education proposed by educational philosophers. The terms are comprehensive; they are descriptive of ultimate goals and hence provide quite nebulous concepts. They are greatly useful, however, in indicating general fields, and for the more practical guidance of teachers they have

been split up, in our new syllabus, into their component parts, which we call *specific objectives*. Only those specific objectives which are most attainable through physical education activities are considered in our syllabi; and these, we believe, are sufficiently definite to provide reference points for practical use, or guides to the selection of measurements and methods. With these definite goals in view, teachers may more readily measure the progress made by pupils toward the goals; and thus evaluate the methods, types of activities, administrative organization and policies, equipment, teaching efficiency, and other factors of educational machinery.

At the outset we determined upon what we believe to be the primary, though not necessarily the most important, educational aim of physical education, which is stated as *dynamic physiologic health*, or *physical fitness*, and may be defined briefly as "capacity for physical activity." We believe this should be our primary aim not only because it is a fundamental present and future need of all school children and because it is essential to all learning, but also because physical education activities so directly, so obviously, and so greatly affect physical fitness whether for good or ill. Our programs are therefore adjusted first in respect to their effects on general dynamic health, or fitness for physical activity.

Since the effects of physical activities themselves are indeterminate, depending on the needs, capacities, and interests of the individual child, pupils are first classified according to their general physical fitness, so that their programs may be properly differentiated and adjusted to their individual health needs. This screening process is accomplished by means of physical fitness tests and medical examinations. The medical examinations are given by school or family physicians, and the physical fitness tests are administered by physical educators.

A TEST OF PHYSICAL FITNESS

The test generally used in New York State is the now familiar P.F.I. battery. It is described and discussed quite thoroughly in a text [1] and its process of development and statistical defense are presented in detail in a doctor's dissertation.[2] Briefly, this test comprises the factors of age, height and weight, and a battery of seven dynamic tests including lung capacity and strength measurements of the muscles of the right and left forearms (grips), the muscles of upper arms and shoulder girdle (pull-ups and push-ups, with special adjustments made for girls), and back and leg muscles. The tests are simple; but accuracy and uniformity of testing technic, as in all careful testing, are important. As an aid to teachers in standardizing their testing technic and applying the resulting data educationally, A. S. Barnes and Company has issued a manual,[3] in

[1] *Fundamental Administrative Measures in Physical Education*, Frederick Rand Rogers, The Pleiades Company, Newton, Mass.

[2] *Physical Capacity Tests in the Administration of Physical Education*, Bureau of Publications, Teachers College, Columbia University.

[3] *Physical Capacity Tests:* Notes on Testing Technique and the Uses of the Scores.

which testing techniques are illustrated and explained in detail. This manual is based on five years' experience of directors in New York State, testing some hundreds of thousands of boys and girls in junior and senior high schools.

The scores made by each pupil in the separate items of the test are added and constitute the individual pupil's *Strength Index*. By dividing this achieved S.I. by the norm for the age and weight of the individual, a quotient called the *Physical Fitness Index* (P.F.I.) is calculated. The norm tables for boys and for girls are different and are adjusted to all combinations of age and weight.

These tests are given to junior and senior high school pupils, usually not over twice a year; and if properly organized by the physical director can be given to pupils at the approximate rate of one pupil per minute; that is, a group of forty pupils can be tested in forty to forty-five minutes, with the aid of one or two adult assistants and a few trained pupils.

HOW THE DATA ARE USED

Having tested all pupils, the teacher arranges their individual record cards in progressive order according to P.F.I.'s from the lowest to the highest. These usually range from about P.F.I. 45 to P.F.I. 160. A percentage, usually 15 to 25 per cent (depending on the available staff and facilities), of these record cards is then counted off, beginning with the lowest P.F.I., thus determining a division point, usually at about P.F.I. 85–90, and pupils whose scores are less than that are regarded as being "low in physical fitness." *Medical examinations are given prior to the tests and pupils found to be unfitted for the tests are placed automatically in the low group.* A search is then made for the probable causes of low physical fitness in each individual case, upon the basis of which suitable individual programs are determined, with the chief, though not exclusive, emphasis on the correction of physical abnormalities and health development. The programs of the high fitness group (pupils with P.F.I.'s of over 110 or 115) are similarly adjusted, with the chief emphasis on the development of cultural appreciations and of good social traits, such as cooperation, ability to meet responsibility, courage, honesty, perseverance, and others. Pupils in the middle group (between P.F.I. 85 and P.F.I. 110) are provided with the usual general program of activity with all objectives about equally emphasized.

A second important use of strength tests is in the equalization of the powers of opposing teams or individuals in sports. Strength tests have been found to be highly useful in accomplishing this adjustment, *whose end is the improvement of pupils' social efficiency.*

RESULTS

The results achieved by these programs of measurement and adaptation of activities to individual needs are difficult to summarize briefly.

1. Pupils increase markedly in physical powers (it has repeatedly been shown that, in traditional programs, the tendency is for pupils to decline steadily though slowly). Discipline becomes a minor problem. Pupils' social traits improve more rapidly than in the traditional programs. The organization of work makes it possible for the physically superior pupils to improve their "culture" more rapidly. Thus all educational aims are better served.

2. Parents derive much more satisfaction from the objective methods of determining their children's needs, from the obvious good results achieved and from the evidence given that teachers have reasonable aims and perform valuable services.

3. Principals and superintendents are likewise pleased and encouraged to provide better facilities and more equipment and time for physical education.

4. But perhaps the most significant gain is in the increased integrity of physical educators themselves, in their assurance that worth-while aims are being achieved in fact.

This rough outline can give only a general picture of the New York program, but it may serve to indicate our underlying philosophy and some of the ways in which this philosophy is being applied in the selection and use of tests, in curriculum construction and differentiation, and in the determination of administrative policies. The P.F.I. tests have proved to be very significant as a measure of general physical condition, or physical fitness; and, though it is inevitable that errors are made occasionally in using scores for pupil classification in unusual cases, these tests have been valid and practical as a basis of program organization and as a measure of pupil progress. After all, "the *test* of the pudding is in the eating"!

Calibration and Uses of Fitness Tests in Westmount High School, Quebec

By Kenneth H. Murray

1. Too many claims of results in physical education, whether in health, morals, or social traits, have been guess work. We physical educators have hoped or believed improvement was being made, but we very seldom prove our claims by actual figures.

2. Accurate measurement is absolutely necessary to know where to start the training of the children. We can, of course, give all pupils a certain set program year after year, and usually we do, in spite of the fact that children are different and each one needs different treatment to meet his or her needs. Of course, certain phases of our program are applicable to all; but to get the best results from our work we must know where we start, we must know our destination, and we must measure progress along the way. Otherwise physical education cannot be termed scientific, and therefore cannot claim to be effective in any direction.

3. Tests can become unwieldy and take up too much instruction time to warrant their use. This has often been the fault in the past; and administrators have frowned upon tests for this reason; but this condition is not inevitable. The fact is that such failures of tests are due to another condition: the examiner does not know his ultimate goal, and particularly as related to the tests he gives. If tests are selected in terms of educational aims, if they can be made concise, and if they are properly interpreted and used, they become indispensable. Indeed, as we have observed above, they *are* indispensable to the orderly or certain attainment of any objectives.

4. Only those tests which have definite purposes and are used to attain them should be utilized. Too often, in physical education as well as in academic subjects, tests have been made and nothing done with them. The results have just been filed as a matter of record. ***Tests should result in action.*** They should be used to determine pupils' strong and weak points and the effectiveness of methods of teaching, rather than as ends in themselves. They should, in brief, become guides to the modification of programs.

5. The material presented hereafter reports a first attempt by the writer to put his teaching of physical activities on a scientific basis. The status of each pupil was found by giving prevalidated tests. These same tests were repeated later and the amount of improvement was calculated through proper statistical methods.

6. As a preliminary to testing, the writer calibrated his instruments. Since these procedures are of great importance to any scientific program,

and since physical educators are relatively unfamiliar with them, they are reported in detail here.

7. The material following that on calibration of apparatus shows the results of the first year of work at Westmount. Various teaching programs were tried on the group as a whole to test their values. The results were fairly satisfactory. More specialized work will be carried on for the individual cases since this validation of the program for the whole group has been determined. The results of the "general improvement programs" are shown in this paper.

CALIBRATION OF INSTRUMENTS

The Spirometer.—Calibration was carried out to determine correct graduations on the spirometer, which was of unknown manufacture. It was without a counterbalance but with a light head. The possibility

CHART I

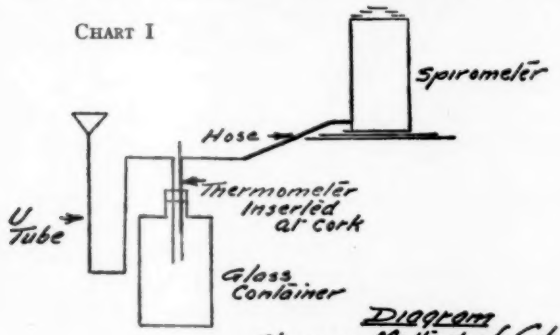


Diagram Shewing Method of Calibration

that the manufacturer did not allow for air shrinkage due to the warmer air from the lungs hitting the cold-water-cooled can made a calibration practically necessary for accurate results.

The procedure was as follows, using apparatus as illustrated in Chart I.

1. The temperature of the water in the can was taken and found to be 18 degrees C.

2. 2000 c.c. of warm water were placed in the bottle. This water varied from 50-70 degrees C. This water warmed the bottle and the air in the bottle to 33-34 degrees C. The "U" tube was filled with water and the marker on the can was set at 0 c.c.

3. It was found that water at 54 degrees C. after flowing through the apparatus gave an air temperature of 37.5 degrees C. at the entrance to the rubber tube leading to the spirometer as it would be used in actual practice. Water at 54 degrees C. was poured into the funnel. The water went through the "U" tube, which acted as a check, into the bottle and forced air up into the spirometer.

4. 500 c.c. amounts of 54 degree C. water were poured in the funnel and when through the funnel, the amount the can was raised was marked on a paper strip superimposed over the original readings on the spirometer.

5. Three different tests were taken.

6. The connections were tested under water for air leaks and none were found.

7. Only heated water was used. Time did not permit a trial with cold water to displace the air to see how it compared with the can.

8. One continuous pouring without stopping was also used and was the same as the third reading.

9. Some trouble was found at the start. When the initial air was forced into the spirometer, the distance from 0 to 500 c.c. varied greatly in each test. There was a slackness of varying amounts in the original movement to be taken up. After this was taken up, the steps were constant. To offset this handicap, the scale was moved down so that the can had to receive about 250 c.c. of air before the 0 mark. This meant that pupils taking the test would be required to give a slight blow to take up the slack and have the pointer start at 0.

10. The metric system was used in the experiment because of the lack of a suitable container for measuring the water in the English system. The readings were later converted from metric into the English.

11. Results of testing gave results as reported in Table I.

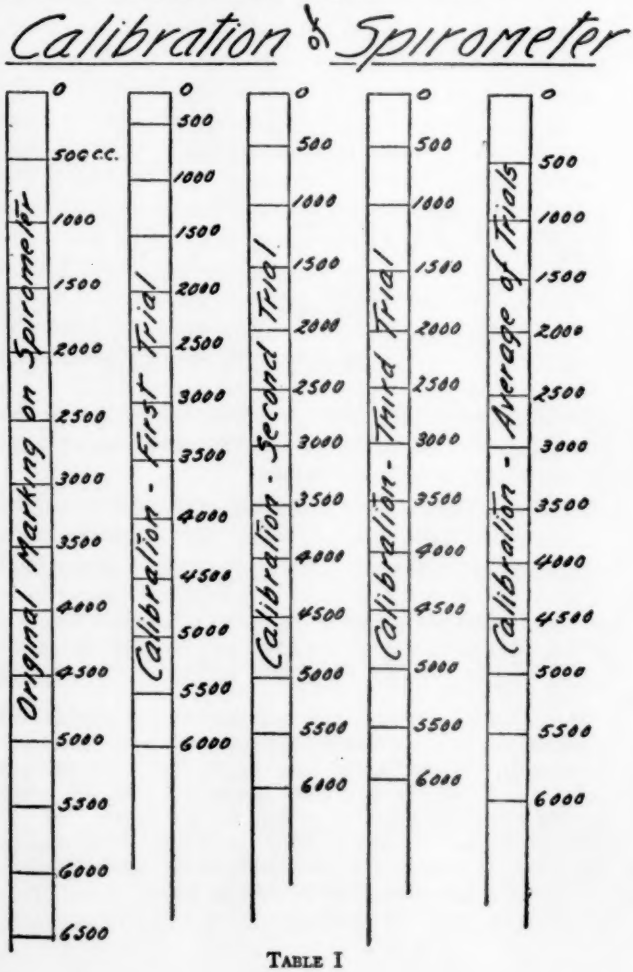
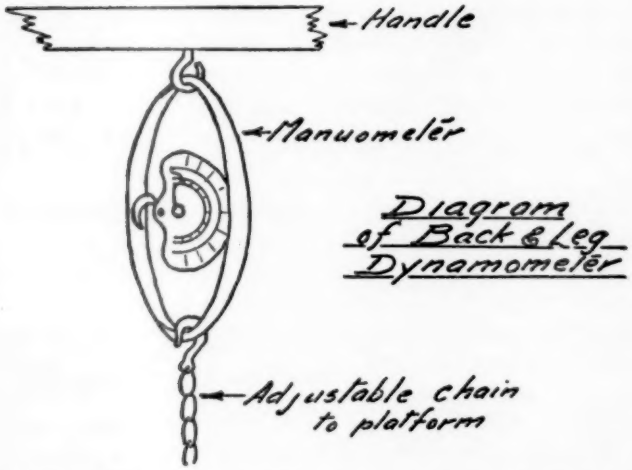


TABLE I

The Back and Leg Dynamometer.—This instrument was unusual in that it was rigged up out of an elliptical manuometer, supplied by the George Tiemann Company of New York. This instrument had been in the department for some years and there was no record of its ever having been tested before.

The use of this instrument for back and leg tests should interest physical educators who find difficulty in securing a hundred dollars or so for the standard back and leg dynamometer. The Tiemann instrument costs about eighteen dollars.



1. This hand dynamometer was hung from a beam by a hook. A large metal bucket of known weight was placed by means of another hook on the bottom of the dynamometer. The weight of the bucket was marked on a paper scale pasted on the face of the dynamometer.

2. Additional weights of fifty pounds each (coal) were placed in the bucket. Each of these additions was marked on a calibrated scale.

3. When the bucket became full of coal, an individual weighed himself and then hung on the chain suspended from the dynamometer. Two persons in addition to the coal was as far as the test was carried, although the scale was marked up to 1000 pounds.[1]

This instrument, as nearly as could be judged, was perfect when properly calibrated.

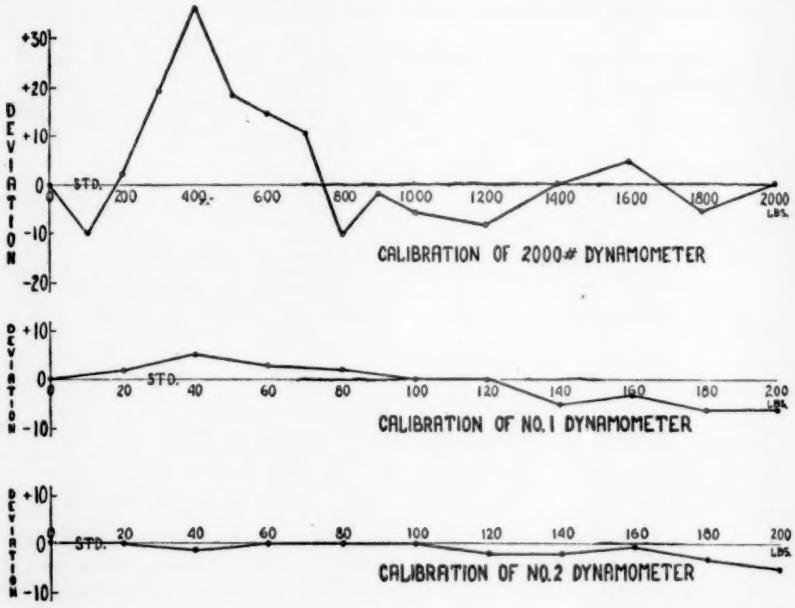
The Manuometer.—This instrument is the same as that calibrated in Section 2—Back and Leg Dynamometer. It was marked for squeezing and pulling. The pulling was calibrated and found correct. The method of calibration for squeezing is to fix the manuometer in a vise and then hang known weights on it, suspending them by strong cord. The writer is indebted to Robert Laveaga of the Huntington Avenue Y.M.C.A., Boston, for Chart II which records the results of calibrating dynamome-

[1] The calibration should have been carried through 1000 pounds. (Ed.)

ters used in his institution. These calibrations were made by Lyman M. Dawes, using standard and highly scientific instruments and demonstrate the need of calibrating equipment. No apparatus should be accepted from factories without checking its accuracy.

PROCEDURES

Tests were given, using the instruments descibed above, in December, 1933, and June, 1934, according to procedures outlined in the manual



Physical Capacity Tests.[2] Following the testing program, the writer conducted his regular physical education program, which stressed the following activities and methods:

In the fall, the activities consist of touch rugby and some soccer. The inside activities are the usual winter team games, basketball, volleyball, and other gymnasium games for one day of the week and apparatus work, with emphasis upon mat work, on the remaining day. In the spring, softball (playground baseball) tennis, track and field are given in the physical education classes.

It should be explained that two forty-minute periods are allotted to physical education each week and that five specially trained student instructors are appointed for each class of thirty pupils. The class work is carried on by these instructors leaving the director free for special work in the class.

[2] A. S. Barnes & Company.

The program was modified from "form programs" to effect changes in physical fitness as follows:

Vigorous exercises were given all the boys for part of each class period of physical education.[3] While team games were being played on the gymnasium floor, the remainder, not playing at the time, were given wall bar exercises for two-thirds of the period. They were really given a strenuous workout which lasted from ten to fifteen minutes each lesson.

Individual pupils' programs were modified as follows:

Those with P.F.I's under one hundred in the December, 1933, test were given slightly more attention than those with P.F.I's of over one hundred, but very little attempt was made in organizing an individualized program for the pupils. The object of the project was to determine the results of the program in increased P.F.I's in the whole group in order to validate the work and the measurement program with a view to individualized work the following year.

RESULTS

1. In this comparison of the December, 1933, and the June, 1934, P.F.I. Test, all records were included regardless of whether pupils decreased, stayed the same, or increased in their Physical Fitness Indices.

2. Three hundred and five boys took both tests. Of these, 48 decreased their P.F.I. in the June test; 5 stayed the same, and 252 increased. The increases and the decreases have been analyzed in detail, but are not reported in this paper.

3. The December average P.F.I. was 102.6 while the June average was 111.59 for the same boys, showing an increase in the school average of 8.99 points or 8 per cent.

4. The middle two-thirds of the boys in the December test scored between 84.3 P.F.I. and 120 P.F.I. The middle two-thirds of the boys in the June test scored between 91.15 P.F.I. and 132.03 P.F.I.

5. A coefficient of correlation of .83 was found between the December, 1933, and the June, 1934, tests. This is not a measure of the reliability of tests but of variation in true fitness during the interval.[4] Many forces contributed to the changes during the six months. Among these the most important were sickness and differences in intensity and quality of training for the improvement of the individual P.F.I.[5]

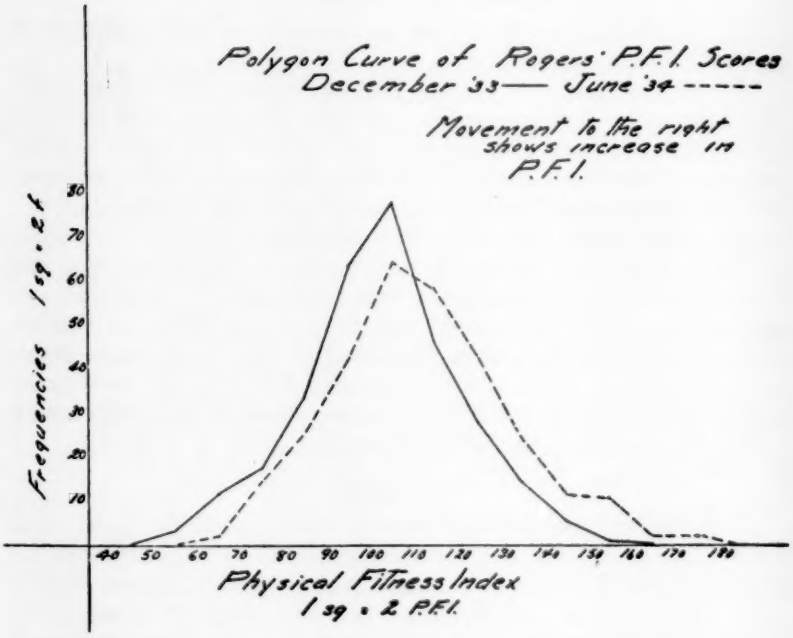
6. The polygon curves showing P.F.I. distribution of pupils in December and June indicate approximately the same improvement for pupils on all P.F.I. levels. If any significant differences occur, they are a relatively lesser improvement for low P.F.I. pupils and greater improvement for high P.F.I. pupils.

---

[3] Bukh, *Primary Gymnastics.*

[4] The reliability of P. F. I. tests is approximately .97. This figure has been established by various experimenters working independently.

[5] It is interesting to note that Rogers found practically the same correlation coefficient (.84) for 347 boys for tests made in September 1924 and June 1925 in Montclair, New Jersey. See *Fundamental Administrative Measures in Physical Education*, p. 246.



These conditions are direct consequences of failure to segregate pupils according to P.F.I., so that the director could concentrate on those with low scores. A special effort will be made in the future either to effect segregation into special classes or to separate boys into *P.F.I. squads* and individualize instruction for the low P.F.I. pupils.

7. A few individual records are reported to indicate changes in P.F.I.'s which often occur and problems raised by measurements.

a) P.F.I. 32 in December to 60 in June. Height 73⅝ inches. Weight 196 pounds. Age 14 years, 3 months. This boy is soft and overweight, of the same build as his father. We raised his P.F.I. by reducing his weight and increasing his exercise.

b) P.F.I. 181 to 207. Heigh 66 inches. Weight 125 pounds. Age 14 years, 4 months. This boy is extremely well-built. He has been working too hard in physical education courses. Next fall he will be led *away* from physical activities to protect him from going stale or from a physical breakdown.

c) P.F.I. 32 to 65. Height 66½ inches. Weight 196 pounds. Age 15 years, 4 months. This is a clear case of obesity. The boy was prevailed upon to modify his diet and engage in more exercise. His weight is dropping and his strength increasing —his P.F.I. having *doubled*.

d) P.F.I. 36 to 46. Height 73½ inches. Weight 170 pounds. Age 15 years, 8 months. This boy is about average weight for his height. But he is actually out of proportion, effeminate—probably a glandular case. Very little has been done for him so far, perhaps little can be done without an operation.

e) P.F.I. 49 to 53. Height 69½ inches. Weight 188 pounds. Age 16 years, 9 months. This boy improved very little during the year. He had a "mouthful of rotten teeth" according to his dentist. These have since been removed and the boy should show great improvement in P.F.I.

The Validity of Various Tests as Measures of Motor Ability*

By Elizabeth B. Wellman

EACH year it becomes increasingly apparent that physical education needs more valid and standardized tests of motor abilities to measure the effectiveness of teaching techniques and of teachers and to rate pupil progress more accurately. Moreover, each year teacher-training institutions preparing physical educators realize anew that many of their graduates, because they lack motor ability, cannot secure or hold positions as teachers. The demand for instruments to meet these needs has already yielded a number of standardized tests to measure motor ability; but most of these either lack proven validity or were designed primarily for other purposes than as means of selecting students for teacher-training institutions. The writer, therefore, undertook a study of the validity of various existing tests with the two-fold purpose of determining which was most applicable to measure the motor ability of high school girls and college women and which might be most useful as aids in selecting students for teacher-training institutions.[1]

This study was conducted at the Sargent School of Physical Education of Boston University in 1932–33. It revealed many interesting facts in the comparison of various tests. Certain ones designed to measure "native motor ability" probably fail to do so to any useful degree, while the simplest physical fitness tests prove more valid as measures of actual skill than do tests designed to measure these functions directly. The author here anticipates her conclusions to report that this study amply supports McKinstry's observation [2] that anthropometric tests and particularly those of lung capacity and strength are still our most valid measures of present or future success in physical education, for women as well as for men.

THE CRITERION

The major problem for which a solution was desired was *to discover, among a group of tests of speed, agility, balance, strength, and native motor ability, a test or battery of tests which might be used in restricting admissions to teacher-training schools.* Therefore a criterion had to be chosen as a true measure of "skills necessary for success as physical educators." This criterion was *grades received in physical activity classes*

* This report is an adaptation of a Master's Thesis submitted to the Boston University School of Education in 1933.

[1] The reader should review also Miss Helen McKinstry's excellent report, *A Study of Estimated and Actual Success of Graduates of a Normal College of Physical Education*, Master's Thesis, New York University, 1932. Her bibliography is especially well chosen.

[2] See the source quoted in note 1.

at Sargent School. Although subject to the criticism of "subjectiveness," grades are at present the most definite evidence of students' success in activities at most colleges.

In defense of the use of grades in this study, and for other obvious reasons, the following points are made:

1. No objective criterion was available, for the purpose of the study was to determine the relative value of the most useful objective tests.
2. The grades given were assigned by instructors after at least one year's intimate acquaintance with the students and their work.
3. Grades were given by three or more teachers.
4. Two of the ten sets of grades were entirely objective; they were given by the author in stunts and apparatus activities.
5. Other grades were determined by objective achievement tests in particular functions, by teaching ability, and by theoretic understanding of the subject. Thus these were not truly measures of skill, but included other factors relating to professional ability as instructors in the skills.
6. The fact that the grades were composites of actual skill, teaching success, and theoretical knowledge inevitably reduces the correlation between marks and objective tests of physical abilities of whatever nature. This fact is of great importance in interpreting data.

THE TESTS

The tests used were:

1. The Brace Scale of Motor Ability Tests.[3]
2. The Burpee Test of Motor Agility and Coordination.[4]
3. The Physical Fitness Index.[5]
4. Various activity tests of speed, agility, and balance.

The Brace Test and P.F.I. are too well known to require further description here. The Burpee Test consists of a series of movements from erect standing through squatting to prone fall position and return, executed as many times as possible in ten seconds.

The balance test consisted of a battery taken mainly from the Report of the Committee of the American Physical Education Association, November, 1925.

The agility test was a combination of standing high and broad jump, height of jump being measured from standing-reach height to jumping-reach height, and the broad jump from toe line to heel location at end of jump. Scores were the combined number of inches the body was moved in the two jumps.

The speed test consisted of a two-lap run from a standing start on an oval track with an inside measurement of 157 feet. Times were read to the nearest tenth of a second.

---

[3] D. K. Brace, *Measuring Motor Ability.* New York: A. S. Barnes & Co., 1927.

[4] C. H. McCloy, *Measurement of Athletic Power.* New York: A. S. Barnes & Co., 1932.

[5] F. R. Rogers, *Physical Capacity Tests.* New York: A. S. Barnes & Co., 1930.

RELIABILITY OF THE TESTS

The Physical Fitness Index and its component Strength Index have reliability coefficients of .94 to .98, which have been verified by many independent studies. McCloy has found a reliability of .67 for standing broad jump and .74 for the running high jump. It is not unreasonable to expect approximately the same coefficient for the standing high jump. Brace claims one reliability coefficient of .90 for his Scale, but the method by which this coefficient was established is statistically indefensible. His other reliability coefficients ranging between .71 and .82 are probably more nearly correct. Bovard and Cozens report a reliability of .97 for the 100-yard dash. No figures have been offered for the Burpee test. Reliability is unknown for balance tests and honor credits.

Of course, the reliabilities of school grades and marks are known to vary with teachers and schools. The intimate knowledge which Sargent School instructors have of their students renders it likely that the reliabilities of their marks are relatively high. However, the reader should again mark this point: the low reliabilities of school marks inevitably lower correlation coefficients between them and all objective tests of skill or other physical functions.

STATISTICAL TREATMENTS OF DATA

The criterion, "honor credits," was determined for each student by transmitting grades into numbers:

A.....3
B.....2
C.....1

Each student's scores in each physical activity course were then added and the total called "honor credits."

Scoring in objective physical tests was done according to the method prescribed by the author of each. Records were secured for 170 girls.

Data were treated statistically using the Pearson product moment method of correlation and the Yule method of partial and multiple correlation. (See Tables for zero, first, and second order correlations, regression equations, and multiple correlations.)

Honor credits correlated highest with the Physical Fitness Index, the correlation coefficient being .53 and the predictive index 15 per cent. The correlations with this and other tests were as follows:

Test	*Correlation Coefficient*	*Predictive Index*
P.F.I.	.53	.15
Brace	.35	.06
Speed	.39	.08
Agility	.38	.06
Burpee	.37	.07
Balance	.23	.003

It is interesting to note that the P.F.I. correlates with the criterion more than twice as closely as does the Brace Test, which was designed by its author to measure "motor ability," while the P.F.I. was designed chiefly or first to measure "capacity for physical activity." Also, the partial correlation between honor credits and the Brace Test *with P.F.I. held constant* is—.054, showing no relationship between Brace Tests and the criterion *beyond the strength factor.*

The highest correlations obtained between any two tests were between speed and agility .73, and between Brace and P.F.I. .72. The correlation between speed and the Burpee test is surprisingly low, being only .31.

What will be correlations between the criterion and combinations of objective tests?

Using a battery composed of speed, agility, and Burpee, the three least-known tests, the multiple correlation of this battery with honor credits is only .50, indicating that honor credits predicted from this battery will correlate with actual honor credits received .50, or in terms of the Predictive Index, the predicted number of honor credits will be correct in only about 13 per cent of the cases or 2 per cent less than using the P.F.I. alone.

Using the two better-known tests as a battery, i.e., Brace and P.F.I., revealed a coefficient of multiple correlation of only .53, indicating as did the other battery that 13 per cent of the predictions made from this formula will be accurate.

The three tests showing the highest correlations with honor credits were as follows:

Test	*r*
P.F.I.	.53
Speed	.39
Agility	.38

Using these tests as a battery resulted in a multiple correlation coefficient of .56.

The increase of the coefficient of multiple correlation in this battery gave an increase of the Predictive Index from 15 per cent to 17 per cent which may be a worth-while gain if the cost of giving the speed and agility tests is worth an added 2 per cent in validity over the use of the P.F.I. alone.

DISCUSSION

It would seem from the figures presented herein that, from the standpoint of prediction of practical success in terms of honor credits in this school for teachers of physical education, of the tests considered, the combination of Physical Fitness Index, speed, and agility gives the highest predictive power and is therefore the most useful. The multiple correlation of this battery with the criterion being, however, only .56 leaves much to be desired. P.F.I. alone correlates with honor credits .53

which is higher than either of the other batteries and only .03, or 2 per cent lower than the best battery. It seems that the result is not worth the added labor of giving and computing scores from the battery, since the P.F.I. alone will give results very nearly as accurate.

It is interesting to note that the single element with the highest correlation to success as here measured is physical fitness, or ***strength in relation to age and weight, speed, and agility***. This seems to indicate that a test of "motor ability" or "motor capacity" might give a more truly representative picture of one's motor powers if it were confined to familiar activities of everyday life, such as weight-lifting, etc., in which the chances are much greater of obtaining a measure of the individual's natural development and real ability, than in stunts or "coordinations," so many of which are unfamiliar to the average person.

The reader is likely to be disappointed in two features of this report —the very low correlations between certain supposedly useful tests of motor ability and the fairly low coefficients in all cases. Concerning the first disappointment, little more need be said, especially since this report merely supports what others have discovered.

On the other hand, it was inevitable that all correlations be low because of the low reliability of the criterion.[6] Unfortunately the exact figure for this function could not be determined, but it would be surprising if it were higher than .85—.90. This higher figure, then, would represent the highest possible correlation between a perfectly reliable objective test of skill and honor credits. This is, in terms of Predictive Index, .564. Then the achieved correlation between Honor Credits and P.F.I. of .53 or P.I. of .13 is really at least twice as high as the P.I. indicates (and is *possibly* four times as high). An upper limit of validity for the various tests as a measure of skill in performing and teaching motor activities is, then:

Test	*P.I.*	*r.*
P.F.I.	.54	.89
Speed	.32	.74
Burpee	.28	.69
Brace	.24	.65
Balance	.01	.14

FURTHER ANALYSIS

Examination of the data involved in this study exposes some interesting facts which, although they had little bearing upon the problem under consideration, are worthy of recording here.

1. Brace classifies the tests in his scale under three main types, i.e. balance, agility, and strength, in the ratio 11:8:7. Transforming the regression equation whose deviation form reads:

Brace score = .37 balance *plus* .13 agility *plus* .004 strength, into its special form by using raw fourth order standard deviations in determining the regression coeffi-

[6] See also discussion by Glauque on page 269 and Park on page 263. (Ed.)

cients (i.e. considering all zero order standard deviations as equal), the equation reads:

Brace score = .25 balance *plus* .41 agility *plus* .35 strength Assuming that our tests of balance, agility, and strength are valid, we now have a real picture of the weight of each variable in determining the Brace score, the weights being practically 3:4:4 as compared with 11:8:7. In other words, statistical analysis shows strength and agility playing a larger part in the test score than balance, although Brace states that balance is involved to a greater extent than either of the other two variables. Since the coefficient of multiple correlation in this case is .76, or P.I. .35, falling short about 70 per cent of perfect correlation, in terms of Predictive Index, we may assume that chance and other factors are involved in the scale even to a greater extent than balance, strength, and agility.

It should be noted that the correlation between honor credits and the Brace Scale drops when strength in the form of Physical Fitness Index is held constant by partial correlation formulae—from .35 to —.054 —which indicates that the Brace Scale is even more highly dependent upon strength for its validity as a measure of any physical quality than the analytic regression equation shows.

2. The following data show first order correlation coefficients and the amount of their reduction from the zero order figures by elimination from the relationship of some contributing factor:

			First Order Correlation	*Zero Order Coefficient*	*Reduction*
1. Honor Credits and Brace	w. P.F.I.	constant	—.054	.35	115.5%
2. Honor Credits and speed	w. agility	constant	.05	.39	87 %
3. Burpee and agility	w. speed	constant	.05	.26	81 %
4. Honor Credits and agility	w. speed	constant	.16	.38	58 %
5. Honor Credits and P.F.I.	w. speed	constant	.39	.53	26 %
6. Agility and speed	w. P.F.I.	constant	.59	.73	19 %
7. Burpee and speed	w. agility	constant	.28	.31	9.7%
8. Brace and strength	w. agility	constant	.56	.61	8.2%
9. Brace and P.F.I.	w. Honor Credits	constant	.67	.72	6.8%

The greatest reductions appear between honor credits and the Brace Scale when the Physical Fitness Index is constant; and honor credits and speed with agility constant. Reduction is to be expected in these partial coefficients when the zero order correlation between Physical Fitness Index and Brace, and between speed and agility are so high, being .72 and .73 respectively.

3. A check on the reliability of honor credits was sought by having instructors rank students in their estimates of students' abilities. These were then correlated with honor credits. The coefficient was .72, which indicates that the reliability of honor credit scores must have been very much higher.

4. The most apparent—though least anticipated—outcome of the study was the demonstration of the validity of physical fitness tests as measures even of motor skills and teaching abilities. However, a little

reasoning will reveal how true this conclusion must be. All life functions depend on physical fitness; and the greater the physical fitness, the greater the potential life efficiency. It has repeatedly been shown in other fields. Even to perform any motor act, strength is necessary. The correlations between strength and speed of running, skating, swimming, and team game abilities for boys have been shown to be very high in literally scores of experiments.[7] Only recently[8] the following correlation coefficients were found between *"ability or speed in learning the kip or upstart"* and

	r.	*P.I.*
Physical Fitness Index	.83	.45
Strength Index	.78	.37
Brace Test	.52	.16

4. The relatively close relationships between physical fitness tests and the criterion suggested further investigations in the physical fitness testing field. The correlation coefficients found are reported in Table I below for the information of researchers in this field.

5. It should be recorded that none of the tests were given under the supervision of their authors or supporters.

6. Data upon which the conclusions of this study are based are included in Table I.

TABLE I

CORRELATION COEFFICIENTS

	r.	*P.I.*
Strength Index and Intelligence	.016	.00
P.F.I. with Intelligence	.015	.00
P.F.I. with S.I.	.68	.27
Honor Credits with (P.F.I. + I.Q.)	.45	.11
Honor Credits with $(\frac{\text{S.I.}}{10} + \text{P.F.I.} + \text{I.Q.})$	.485	.13
Honor Credits with $(\frac{\text{S.I.}}{10} + \text{I.Q.})$	.43	.09
Honor Credits with $(\frac{\text{P.F.I.}}{2} + \text{I.Q.})$	.32	.06

TABLE II

TEST SCORE MEANS AND STANDARD DEVIATIONS

Test	*Mean*	*Standard Deviation*
P.F.I.	107.01	24.6
Burpee	6.35	.665
Brace	10.78	2.85
Speed	21.515	1.31
Agility	83.05	9.0
Balance	13.27	1.8
Honor Credits	20.28	4.3
Ranking	6.43	1.7

[7] See particularly Part III of this supplement.

[8] Clayton T. Shay, "The Progressive Part versus the Whole Method of Learning Motor Skills," RESEARCH QUARTERLY (December, 1934), 66.

The Selection of Physical Tests for Measuring Y.M.C.A. Secretaries[1]

By V. F. Hernlund

THE PURPOSE of the research reported here was to determine the most useful tests to give Y.M.C.A. secretaries to measure their physical fitness for their work. The value of truly valid tests must be very great, for the efficiency of Y.M.C.A. secretaries as well as other administrative officers depends primarily on their physical powers—which often are ignored when selections, transfers, and promotions are made.

THE TESTS

Tests were administered as follows:

1. An electrocardiographic record was secured of each subject's heart action.

2. A test of cardiovascular reaction was administered, using the *Schneider Cardiovascular Test of Physical Efficiency*, the *Foster Test of Efficiency*, and the *Barach Energy Index*.

3. Complete, detailed physical and medical examinations were given, using different methods and securing somewhat different data for (*a*) Indiana secretaries, and (*b*) Ohio secretaries.

4. Strength tests were administered using standard instruments and techniques according to *Physical Capacity Tests, A Manual of Testing Techniques*.

5. Examination of urine.

TESTING PROCEDURES

Indiana.—Tests were given in examination rooms of different Y.M.C.A. buildings in the state. The following cities were visited in the order named: South Bend, Gary, Fort Wayne, Newcastle, Indianapolis, and Lafayette. These cities served as examination centers, each secretary going for examination to that city which was closest to his place of employment.

All tests were given by the same two examiners.

The medical history sheets were filled out when the subject first reported for the examination.

The electrocardiographic record was then taken and the subject told to report to the next examiner in another room.

---

[1] This report is a bare summary of several studies. The research was made possible through a special grant of the Laura Spellman Rockefeller Foundation to the George Williams College, Chicago, and with the cooperation of the Y.M.C.A. Graduate School, Nashville, Tenn.

For the remainder of the examination all clothing was removed and the cardiovascular test administered at once. The routine physical and medical examination followed and then the strength test was administered. A urine specimen was left in the examination room. In the tests given to the Indiana secretaries, quantitative glucose and creatinine determinations were run on three hour samples of urine, using a calorimetric technique. Specific gravity, reaction, albumen, and total volume were also recorded. To make the three-hour collection of urine possible, wide mouth specimen bottles were mailed directly to all the secretaries with instructions for collecting and keeping cool the sample of urine on the day of the examination. Subjects brought their specimens with them to the examination rooms. They were kept cool and analyzed at the close of the day.

The general secretaries at the examination centers visited made possible the scheduling of subjects at regular intervals of time. The entire test exclusive of the urinalysis required from forty to fifty minutes.

Ohio.—One examiner performed all the testing procedures. Examination centers were in the following cities visited in the order named: Toledo, Tiffin, Cleveland, Akron, Canton, Dayton, and a second series at Cleveland and Toledo.

The same routine was followed as in the examinations in Indiana excepting that the entire procedure was performed in one room. The urinalysis consisted of the examination of a specimen voided in the examination room. Qualitative glucose and albumen were run as well as total volume, specific gravity, and reaction.

INDIANA RESULTS

In the earlier work on the student body at the Y.M.C.A. College in Chicago and also on the tests administered in Indiana it was apparent that light-weight but well-muscled individuals had quite an advantage over subjects who had about the same musculature but carried in addition an extra load of weight in the form of subcutaneous fat. The Physical Fitness Index scores of two such subjects were usually widely separated.[2] Dr. C. H. McCloy of Iowa University had been experimenting with a new method of scoring the push-ups and pull-ups to equalize these factors. Prior to the publication of his article in the *Research Quarterly* of December, 1931, he had allowed the writer to use the formula he later published, in comparing the records of the two types of individuals mentioned above.

It was found that the total score of the heavier individuals using the new method of scoring "strength of shoulders" was raised considerably, while scores of lighter subjects either remained the same or dropped.

[2] And quite properly so according to the philosophy of the P.F.I. as established and used in public schools. Mr. Hernlund's scoring technique gives a slightly different meaning to P.F.I.'s. In particular and for example, overweight individuals are not so forcibly warned of their deficiencies by the Hernlund-McCloy scoring techniques. (Ed.)

The new method seemed to have possibilities in dealing with older individuals who usually carry more excess fat than the average college student. Both methods of scoring were eventually tried, however.

Strength Index scores were first calculated on all of the Indiana data using both the standard and new methods. Table I reports the scores of Indiana men in the various tests, including the P.F.I. scores, using as norms for strength, norm tables based on tests given the Y.M.C.A. secretaries. It should be remembered too that because of the decided difference in strength test items and strength test scores of the physical education students and other secretarial students at the Y.M.C.A. College, Chicago, the groups were treated separately. A table of norms was established for each group. It seemed logical that norms for physical education students in college would be the norms to use for physical directors in the field. Likewise the norms for secretarial students would serve other than physical director secretaries in the field. The average P.F.I. for the Indiana group was 92. This included physical directors as well as other secretaries.

Subjective evidence noted in the examining room indicated that the value 92 was a relatively low figure for the average in Indiana. The examiner having seen and examined both groups decided to apply the new method of scoring strength of shoulders. This treatment of the strength records on the Indiana group was not made, however, until after the Ohio group had been examined.

The Health Score.—Table I reports the health scores calculated from the findings on the medical examination blank. The scoring method was developed by Dr. G. G. Deaver, Y.M.C.A. College, Chicago. The complete medical blank and the scoring system were published in the *Journal of Physical Education* in February, March, and April of 1930. The average score of the Indiana secretaries is 95.5. A score of 100 represents the ideal subject medically and physically from both a structural and functional viewpoint.

The Cardiovascular Tests.—A cardiovascular test score was not applied to the Indiana records because no adequate scoring device for the test used was found. A special cardiovascular technique was used because no adequate test of cardiovascular efficiency had as yet been discovered. The technique in the present test supplied everything that other tests have supplied and it was therefore administered to the group as a possible means of throwing more light on the entire matter. Table II shows the extent to which abnormalities in the cardiovascular records assembled were present. All of the subjects had electrocardiographic records taken of their hearts.

It should be noted that there were seven of these cardiovascular records pronounced abnormal or indicative of cardiac impairment. Only three of the seven are to be found among the list of other cardiac abnor-

TABLE I

SUMMARY SHEET OF DATA SECURED IN THE EXAMINATION OF Y.M.C.A. SECRETARIES IN THE STATE OF INDIANA

Subject	Age	Ht.	Wt.	Ach. Str. Index	Physical Fit. Index Old	Physical Fit. Index New	Health Score Old	Health Score New
1	31	67.4	138	1762	103	107	91.5	96
2	22	72⅞	162	1970	105	110	91	96.5
3	25	70⅛	158½	2016	110	114		95
4	23	68⅜	180½	Has recurrent disloc. shoulder			86.5	87.5
5	48	66¼	145½	1695	86	100	93	97
6	46	71	195	2228	86	111	93	97.5
7	31	69.3	172	1722	69	93	94	95
8	27	67½	140	1762	102	106	94	98.5
9	33	70¾	202½	1664	54	81	86	94
10	36	73	192½	Could not do back and leg lift			91½	96
11	38	70.2	176	2548	144	135	96.5	97
12	21	68¼	152½	Did not do pushups			91	95.5
13	29	68½	168	2421	123	132	95.5	96.5
14	29	68⅜	151¾	1686	82	97	93.5	95
15	24	67	142	1527	74	92	90.5	95.5
16	22	69¼	210	1151	50	55	87	89.5
17	22	Did not do strength test.					96	98
18	23	68⅝	146	1938	114	114	93.5	98
19	51	68¼	135	1785	102	110	84.5	91
20	34	68	128	1593	93	101	92.5	95.5
21	32	65¾	177¼	2027	88	107	93.5	95
22	35	69⅞	142	1441	74	86	91.5	94.5
23	44	69½	160	2346	123	132	94	98
24	27	68	126	1525	88	97	97	97
25	24	76	186	2207	95	113	95.5	97.5
26	25	70½	152	1779	85	103	87.5	93
27	48	72½	167	1848	81	101	91.5	97
28	37	68¾	145¾	1751	100	104	97	99.5
29	22	70.8	166	2154	112	118	98	100
30	36	69⅛	161	1821	89	102	94.5	97
31	26	72	170	1974	103	108	96.5	100
32	18	65½	147	1775	110	116	95.5	98
33	26	69⅜	175½	2136	94	114	90	94.5
34	28	66	121	1638	117	107	95.5	95.5
35	31	72.7	200½	2159	85	106	93	98
36	59	68½	160	916	53	51	91.5	95.5
37	34	66½	159	2015	114	114	97	97
38	32	69½	139	1423	76	86	94	94.5
39	40	72.4	189	1801	66	91	94.5	96.5
40	69	64⅝	149¾	Did not do pushups			89.5	92.5
41	16	71⅜	156¼	1809	99	103	94	96.5
42	47	68⅝	168	1762	76	96	93.5	95.5
43	44	67	141⅞	1865	109	112	93.5	98
44	26	68½	146½	1852	98	109	89	91.5
45	31	69	171	2012	88	109	98.5	99.5

TABLE I (Continued)

SUMMARY SHEET OF DATA SECURED IN THE EXAMINATION OF Y.M.C.A. SECRETARIES IN THE STATE OF INDIANA

Subject	Age	Ht.	Wt.	Ach. Str. Index	Physical Fit. Index Old	Physical Fit. Index New	Health Score Old	Health Score New
46	44	66.8	178	1871	75	99	92.5	95.5
47	39	68⅛	174½	1772	71	95	93.5	97.5
48	50	71	168	Did not do Arm Str.			87	92.5
49	32	Paraplegia-uses wheel chair					85.5	91.5
50	40	69¼	223	2118	69	97	94	95
51	18	65¾	162½	1724	74	96	91.5	93.5
52	21	70¾	158¾	1953	103	110	94.5	97
53	39	66	165	1670	70	92	85	89
54	38	67.7	175.5	1695	66	90	92	95.5
55	35	69⅛	167	2337	116	128	92.5	97
56	29	70½	156¼	1947	96	111	87	94
57	20	68.4	184	1868	72	96	89.5	92.5
58	40	69.8	170	1758	75	95	93	94
59	53	65.5	172	1593	62	86	90	92
60	34	67.3	140	1822	104	110	94.5	94.5
61	30	70.2	149	Did not do str. test			83.5	90.5
62	25	66.5	146½	1788	90	105	95.5	97.5
63	31	69⅛	167½	1870	92	102	94.5	97
64	41	64.8	184	1438	61	74	96.5	89.5
65	23	67⅞	135	Did not do pushups			94	97
66	24	64.1	123	1551	96	100	89	92.5
67	42	68.8	168.5	1888	91	103	93.5	96
68	31	68.3	163	1903	92	106	97.5	98
69	25	68.6	139	Did not do pushups			91	94
70	42	71¼	188	2202	91	112	92	97
71	49	70½	180	1556	58	81	82	86
72	29	62	113½	1574	104	106	97	98
73	30	70¼	178	2006	81	106	95	94.5
74	23	71	172	2168	113	117	93	94.5
75	38	68¾	184½	1812	68	94	92	93.5
76	—	67½	163	2250	121	125	No record of blank	
77	53	69¼	194	1193	55	60	85	89½
78	35	65⅜	168	1820	76	99	83	89
79	28	66.9	171	1673	71	91	91.5	92.5
80	44	66	134½	1269	63	78	82.5	89
81	30-11	67½	151	1706	83	99	91.5	94

malities. Two of the subjects failed to have a return of the pulse rate to the standing rate within two minutes after exercise. The other subject had a systolic blood pressure slightly above 140. The case of the systolic murmur was apparently sufficiently compensated so that it did not show as an abnormality on the electrocardiographic records. The 4 subjects remaining had very normal findings on the other items in the cardiovascular test.

It would seem from these findings that the electrocardiographic record is indispensable in a complete diagnosis of cardiac impairment. However, indications are also present here that the electrocardiogram alone may not be sufficient to give a complete picture of cardiovascular efficiency.

TABLE II

ABNORMALITIES FOUND IN THE CARDIOVASCULAR REACTIONS OF THE ONE HUNDRED FORTY-NINE SECRETARIES EXAMINED IN INDIANA AND OHIO

	Indiana	*Ohio*
Ret. of pulse rate after Ex. required longer than 2 minutes	11	0
Systolic Bl. Pr. St. above 140	3	1
Diastolic Bl. Pr. St. above 90	0	1
Systolic Bl. Pr. St. below 100	3	1
Diastolic Bl. Pr. St. below 60	3	0
Heart Murmurs	1	3
Abnormal electrocardiographic records	7	

Urinalyses.—In the quantitative glucose determinations on three-hour samples of urine only one abnormal record was obtained.

Creatinine determinations failed to show any consistent relation between the total strength and creatinine or between body weight and creatinine. Earlier work by the writer had shown a very constant relation between body weight and total creatinine by this same method. The writer believes that the three-hour sample both for the glucose determinations and the creatinine findings is not a satisfactory sample of the twenty-four hour output of urine.

OHIO RESULTS

Strength Tests.—The achieved Strength Index score on these records has been calculated using the McCloy formula for strength of the shoulder girdle muscles. Table III reports test scores for the Ohio men. The table of norms by which P.F.I. scores were calculated on these records was prepared by grouping all of the Indiana and Ohio strength test scores. In these scores strength of shoulders was calculated using the McCloy formula. The correlation between the total strength and body weight was determined and a regression equation used to predict total strength when body weight was known. A frequency distribution of the revised strength test scores and physical fitness scores for the Indiana secretaries is shown in Table III.

Cardiovascular Data.—Table II has shown the number of abnormalities of the Ohio group compared with the Indiana group. The Ohio groups have a surprisingly small number of abnormalities present judging from this table. No explanation is given for the difference between the two groups. Perhaps the group as a whole was in better vascular condition than the Indiana group. It is possible that this is evidence that the "new P.F.I." ratings are not as true indices of physical condition as the standard formula and norms, for P.F.I.'s of Indiana men calculated

by the standard formula averaged ninety-two or three points lower than the Ohio group, whereas by the new P.F.I. formula they average six points higher. Electrocardiographic records on the Ohio subjects have not been interpreted accurately enough to make a statement regarding them.

TABLE III

SUMMARY SHEET OF DATA SECURED IN THE EXAMINATION OF Y.M.C.A. SECRETARIES IN THE STATE OF OHIO

	Age	Ht.	Wt.	Achieved Str. Index	New Physical Fit. Index	Health Score
1	54–4½	67.5	153	1682	97	95
2	54–5	64	138	1483	90	95
3	37–1	68¾	169	1548	84	91.5
4	44–8	74	205	2301	111	97
5	29–9	64⅝	119	1388	91	93.5
6	—	68	185	Had severe Varicocele		92
7	27–3	68	155	1452	83	95
8	—	65½	128	1613	102	98
9	—	66¾	145	1586	94	96.5
10	—	68	154½	2143	122	98
11	—	67½	153	1916	110	96
12	30–3	74	200	2004	98	98.5
13	61–3	66	142	Did not do.		89
14	34–0	71½	183	1514	78	96.5
15	36	68	136½	1411	87	95.5
16	26–10	71½	173	1845	99	97.5
17	28–9	67.9	130	1501	94	95
18	48	68⅝	198	Had hernia		91
19	26–3	69¼	136	1748	107	95
20	23–3½	69.9	138	1723	105	93.5
21	31–2	68	176	1872	99	98
22	44–6	68	175	1240	66	92
23	39–10	69.6	165	1694	93	94
24	40–10	64.4	138	1638	99	97
25	—	68½	196	2068	103	98
26	28	70.8	138	1514	92	94
27	45–9	68½	134	1422	88	91
28	39–7	65	160	1835	103	96
29	29–9	68½	166	1323	73	92
30	44–2	67.2	142½	1071	64	88.5
31	—	70⅛	136½	1637	100	93.5
32	32–4	63.4	142	1685	101	98
33	24–2	69½	183	1856	96	93.5
34	24–11	—	130	1567	98	96
35	24–1	71	155	1735	99	96
36	35–2	70.1	176	1953	105	96.5
37	38	62.2	135	1275	79	97.5
38	30–11	67.5	163	1705	95	98.5
39	38–2	66.1	162	1772	99	98.5
40	33–6	65½	135	Did not do.		97

TABLE III (continued)
SUMMARY SHEET OF DATA SECURED IN THE EXAMINATION OF Y.M.C.A. SECRETARIES IN THE STATE OF OHIO

	Age	Ht.	Wt.	Achieved Str. Index	New Physical Fit. Index	Health Score
41	26–3	68¼	158½	1963	110	94.5
42	29–7	70	148¼	1825	107	96.5
43	31	67½	160	2112	118	97
44	34–9	67	127½	1305	83	95.5
45	—	70	186½	1983	101	96.5
46	39–10	73	174	1839	98	97
47	32–10	70.1	177¼	1757	93	98
48	27–10	72¾	176½	1739	92	97.5
49	—	67½	166	1913	105	97
50	24–10	73	175	1732	92	94
51	—	—	137½	1561	95	97.5
52	26–3	67.6	152	1985	115	98.5
53	38–9	66⅜	186	1464	72	91
54	—	65.5	133¼	1489	92	94
55	32–8	72	130	1681	106	88
56	42–10	66.3	144	1623	97	94.5
57	35–7	66	143½	1673	99	96.5
58	—	71	215	1703	80	95
59	30–6	67½	162	1210	90	98.5
60	—	73	204½	1967	95	93.5
61	55	65.2	170	Did not do Str. Test.		91.5
62	24–3	70½	160	1714	96	95.5

Physical and Medical Examination—Health Scores.—Following the examination of the Indiana secretaries in December, 1929, summaries of their findings and their scores were mailed to all of the subjects. Several responses regarding low health scores were received in reply to the statements mailed. Subjects wanted to know why they were given scores as low as eighty and eighty-five when they were "perfectly well" and "had not missed a day's work on the job in years." Some of the subjects mentioned statements made by their own physicians pronouncing them to be in perfect health.

A careful re-examination of all of the Indiana examination blanks revealed several things. Most apparent in the records of the subjects writing about their scores was the fact that in every instance the subject had been penalized on his health score for defects which had been corrected. This, however, was in keeping with the scoring system by which they were being compared to the ideal person from a structural and functional viewpoint of health. These inquiries caused further investigation to see if it was advisable to use the structural ideal as the best guide to determine whether or not a high score was closely related to efficiency to perform one's tasks well. Several attempts at revision were made.

Finally, with the assistance of Dr. T. Zerfoss, Director of Student Health Service, Vanderbilt University, Nashville, Tennessee, a revised scoring system was constructed for the medical blank, the aim of the new scoring system being to penalize those factors showing abnormalities from a functional viewpoint. If they had been corrected by proper medical attention no penalty by a reduction in score was made. The ability of a man to perform his daily duties was considered paramount. Anything which interfered with maximum function should be penalized. If an individual had 20/40 vision with astigmatism and the defects had been corrected by properly fitted glasses the subject was not to have any points deducted from his health score, for these items. On the other basis of scoring the same subject would lose two points from his score. In a similar manner, if an individual had bowlegs and no sign of muscular weakness in these extremities he was not penalized. On the old basis he lost one point. If an individual had bad posture on the old scoring device and a spinal deformity as well, he lost points for both conditions. In the revised scoring system only the deformity itself was penalized. A subject was not penalized if he had had many cavities in his teeth providing they had received proper attention. Other changes in the scoring system as it was developed by Dr. Deaver were made. They all had a similar objective in mind, i.e., to penalize where *function* of the individual on his job might be impaired.[3]

The revised scoring system was first tried on a group of Vanderbilt University students. The results seemed more adequately to place individuals in relation to their health and ability to function efficiently on the job. All of the factors referred to above were kept in mind at the time of the Ohio examinations.

Urinalyses.—Examination of urine specimens on the Ohio secretaries revealed only one suspicious glycosuria. No albuminurias were found.

Composite Treatment of Indiana and Ohio Data.—The Indiana and Ohio test records were then placed together as one group representing the secretaries in the field.

Table IV shows the mean scores for test records on the combined groups as well as each group separately.

SUMMARY AND CONCLUSIONS

The batteries of tests selected were administered to 142 Y.M.C.A. secretaries in the field. A revised method of scoring strength of shoulders in the strength test was used, which does not interfere with the reliability coefficients of the strength test as administered. The

[3] The significance of this change in scoring medical examinations is well nigh overwhelming in its evidence that strength tests may be the most significant of all physical measures. For strength tests are the functional tests which measure the most necessary and universal of all performance: physical activity. (Ed.)

S. I. scores calculated using the new formula for strength of shoulders show a normal distribution among the subjects examined. A table of normal strength index scores for body weight has been constructed using the records of the secretaries in the field. P. F. I. scores calculated using these norms, present a normal distribution.

A revised method of determining health scores was used. Evidence was found (though not reported here) to indicate that the new scoring method which measures *functions* more nearly measures the present health condition of the subjects than does the old method which emphasized structure.

Qualitative urinalyses seem to provide sufficient information for this section of the testing procedure. The three-hour sample of urine ana-

TABLE IV

SUMMARY OF THE MEAN SCORES ON FREQUENCY DISTRIBUTIONS OF TESTS GIVEN TO INDIANA AND OHIO Y.M.C.A. SECRETARIES

	Strength Index Mean Score	Physical Fit. Index Mean Score	Health Score Mean Score
Indiana	1832	102.0	95.3
Ohio	1655	95.9	95.4
Indiana & Ohio Scores combined	1771	99.4	95.36

lyzed on the Indiana tests does not provide an adequate index of the creatinine over a twenty-four-hour period.

The cardiovascular test applied to the secretaries in the field (details concerning the very low reliability and consequent greater lack of validity of cardiovascular tests as measures of heart function for individuals who have no serious cardiac deficiency are included in an article soon to be published) revealed at least one significant fact. The tests as applied (Foster, Crampton, Barach) have been shown to miss entirely suspected cardiac impairment which was later revealed through the electrocardiographic record. However, the electrocardiographic records have also been shown to fail to record abnormalities which are generally accepted in the medical world as borderline cases indicating possible cardiac impairment.

The following conclusions seem warranted:

1. The revised strength test and P.F.I. may be satisfactorily used as instruments to compare the gross muscle strength and physical fitness of individuals or groups in this study. The more we investigated tests of physical efficiency the more apparent does it become that the P.F.I. is a measure of very high validity and possesses many special, if not unique, merits as a measure of the efficiency of the human body.

2. To use the P.F.I. for Y.M.C.A. secretaries, norms of strength

should be established in terms of new arm strength scoring and using the records of Y.M.C.A. secretaries.

3. Revised methods of determining health scores should be utilized in all estimates of health based on physical and medical examinations. It is particularly important that the revision emphasize function rather than or above structure.

4. That the tests of cardiovascular efficiency are not adequate for comparative purposes between individuals or groups who are relatively normal otherwise.

5. That at the time of this experimental work no adequate test of cardiovascular efficiency exists for use by physical educators or others giving routine examinations to Y.M.C.A. secretaries, and that further statistical work should be carried on.

An Experiment in the Psychology of Competition*

By Harold L. Berridge

WHOEVER has been associated with physical education or athletics has frequently found individuals who have every characteristic that makes an ideal player except that mental quality which so outstandingly characterizes the competitor. These non-competitive individuals usually outshine their teammates during practice periods, but fail when placed in situations that *demand* superior performance. It was the experimenter's desire to discover the effect of the presence of competitors on performance. Various classes of unselected college men were used, including freshmen, sophomores, and juniors.

THE PROBLEM

Specifically, the problem was "To analyze the effect of competition by measuring performance under three different sets of conditions." *Set one*, alone, without knowledge of the results; *set two*, alone, with knowledge of the results; *set three*, in the company of other performers with the results known and announced so all could hear.

APPARATUS EMPLOYED

A Kellogg back and leg dynamometer was used to obtain all of the data of this experiment.

PROCEDURE

The groups used were four different classes of physical education students taking wrestling for their required work. No varsity, or any candidate for varsity, nor any intramural wrestler was used. No student was included who had ever been a member of any college athletic team. The majority of the students were taking wrestling for the first time. No attempt was made to equalize the groups by predetermining their strength. Sixty-one individuals were tested.

The four classes were divided into different groups hereafter called *A*, *B*, *C*, and *D*. The tests were listed as *set one*, *set two*, *set three*. The order of taking each set of tests was different for each group in order to cancel practice effects.

---

* This study emphasizes psychological aspects of testing; nevertheless its significance to physical fitness testers is very great; for it demonstrates the importance of testing pupils under "controlled" conditions; i.e. in the presence of their fellows. Otherwise scores will not be the maximal and therefore will not reflect pupils' true conditions. Nor will they be so reliable. (Ed.)

SET ONE

(*Alone, Without Knowledge of Results*)

Each individual was called into the room with the experimenter and the following instructions read: "I am doing some research work in the fields of psychology and physical education. I want you to try and follow the instructions I give you as closely as you can. This test involves three leg lifts. I want you to lift as much as you can at each lift. The results of this test will not have any effect on your grade for this semester. I want you to stand on the foot rest with the hook between your feet so that it is opposite the large ankle bones. Keep your feet far enough apart to give a comfortable position. Keep your back straight, head erect, and your chest well out. Bend your knees well. After this dynamometer is adjusted take a full breath and lift the handles by holding them in place with your hands and straightening your legs. Be sure to lift *only with your legs*." These instructions were supplemented with a demonstration by the experimenter and a picture from F. R. Rogers' testing manual, *Physical Capacity Tests*.[1] After each lift the amount of the lift was recorded, and in set one the individual was not told of the results.

SET TWO

(*Alone, With Knowledge of the Results*)

In this set the individual was called into the room with the experimenter and if it was the first series of tests to be taken by this individual, the instructions were read and demonstrated. In this set, each lift was recorded and the observed was told the result and asked to try to do better the next trial. It is well to note here that when set two was followed by set one, two weeks were allowed to elapse before beginning the new series in order to allow the subject to forget his previously made score. When the individual was in set one before going to set two he was told what his record was in set one; or if he had been in set three he was told what he made in set three. The only limiting condition in this series was that the subject was alone with the experimenter.

SET THREE

(*In Competition with Others*)

In set three the whole group (*A*, *B*, *C*, or *D*) was brought into the room and the instructions read and demonstrated. Subjects took turns lifting so that no individual lifted twice in succession. As each lift was made the results were announced so that every one could hear. All of the groups without exception gathered around the lifter and the "spirit of competition" was shown by their interest and remarks not only in their own lifts but in others. In case the group started with set three and shifted next to set one, three weeks were allowed to elapse to insure the forgetting of the previous records. In case they began with set two after completing set three they began the new set the following week.

[1] A. S. Barnes & Company, New York.

SOURCES OF ERROR

The largest source of error was the dynamometer used. While it was tested by the Engineering Department at the State College of Washington and was found to be accurate, it was scaled in steps of five kilograms. If the pointer was over half way past a mark the higher figure was recorded. In case the pointer was less than half way the lower figure was recorded.

Practice effects may have entered in. The relative strength of each class taken as a whole may be assumed to have remained constant. Though the differences between lifts may have been influenced by practice, nevertheless the schedule for each group must have at least partially counteracted practice effect.

RESULTS

In mean scores set three scored the highest with set two next and set one scoring the lowest. The mean of set one was 536 pounds, set two, 568 pounds, and set three, 616.5 pounds. The results show that the arrangement of the series or previous practice had practically no influence on the results. Table I shows that in groups *A*, *C*, and *D* the ranks of the individual sets correspond to the ranking of the entire group of sets taken as a whole. Group B varied somewhat from the rest of the groups in that the average score of set one was greater than set two, the difference being 13.5 pounds. With the above exception all sets one scored lower and all sets three scored the highest, with sets two falling in between.

The seemingly close relationship of the various conditions used in this test would lead one to believe that the correlation between sets would be high and positive. Using the Pearson formula, the correlation between sets one and two is .64, and between sets one and three the correlation is .62. The correlation between sets two and three is .75. While the correlations between sets are fairly high, there is enough variation from the distribution of best lifts to consider some of the individual differences revealed in individual analyses.

TABLE I

SCHEDULE OF TESTS

With Average Score in Pounds in Each Group in the Order Tested

Group	No. of Subjects	Set First Scored In	Average Score	Time [1]	Set 2nd Scored In	Average Score	Time [1]	Set 3rd Scored In	Average Score
A	16	2	545	2 wks.	1	542	None	3	635
B	22	3	608	3 wks.	1	587	None	2	574
C	9	1	467	None	2	594	None	3	634
D	14	3	589	None	2	572	3 wks.	1	542

[1] Indicates time allowed to elapse between first and second tests.

INDIVIDUAL VARIATIONS

Of the sixty-one persons scored in the three sets the compilation of best lifts shows that

1. Five individuals made their best lifts in set one.
2. Nine individuals made their best lifts in set two.
3. Forty-four individuals made their best lifts in set three.
4. One individual made equal lifts in sets one and two.
5. One person made equal lifts in sets one and three.
6. Two individuals made equal lifts in sets two and three.
7. It is of the greatest significance that individuals who were familiar with tests from previously being tested in sets two and three were able in set one nearly to approach their best in set three. Thus, the average scores for Group B were 608 in set three followed by 587 for set one, whereas Group C raised their average from 467 in set one to 593.5 in set two and 633.5 in set three. Evidently experience in lifting in competition increases scores greatly in solitary performances.

GENERAL DISCUSSION

In reality the groups involved in this study have been of two distinct types due to the conditions of the test. The groups acting under the conditions of set three are co-acting groups and were subjected to the stimulation of sight and sound (the announcement of the scores made by others) of those doing the same thing that they were going to do. In all kinds of competitive performance we may recognize two social factors. The first is social facilitation, which consists in an increase of response merely from the sight and sound of others making the same movements or trying to do the same thing. The second is rivalry, an emotional reinforcement of movement accompanied by the consciousness of a desire to excel in the performance of the task at hand. The second type was the individuals acting alone with only the knowledge that others were going to perform the same act to stimulate them to greater effort.

In some studies referred to by Allport[2] there has been a number of experiments under various conditions leaning to some definite conclusions as to the effect of a co-acting group on the possible score made. In an experiment reported in reasoning it was found that persons could reason more efficiently when alone than when the entire group was brought together. In the co-acting group, it is found in the experiments referred to above that the average deviation was smaller when the entire group acted together than when the performance was alone.[2]

"Rivalry like social facilitation increases the quantity but does not improve the quality of the output." [2] Triplett's experiment with children turning fishing reels showed that, of forty subjects, twenty of them gained markedly in the competitive trials over their average for solitary

[2] Allport, Floyd Henry. *Social Psychology*, pp. 260–291. Boston: Houghton Mifflin Company, 1924.

work. Ten were little affected by the competition. Ten actually lost in speed under the influence of rivalry. The effect of rivalry like that of social facilitation varies inversely with the ability of the worker. In 1914 Dr. W. Moede published an account of rivalry in speed of tapping and hand grip. Seventeen boys between twelve and fourteen years of age participated. The more rapid tappers made actually lower records when tapping in competition with others than when working alone. The speed of the nine lowest individuals on the other hand showed a distinct social increment. This increment was somewhat larger than the decrement of the more rapid half. By thus reducing the scores of the more rapid and increasing those of the slower workers the individual differences in performance were materially lessened.

While some of the experiments of others show different trends than this experiment there is enough likeness to warrant some investigation into the causes of some of the discrepancies. In a recent study at the State College of Washington [3] it was found that motor ability, as such, measured by a battery of tests, had little or no correlation with mental ability. It was cited above that in the tests in reasoning it was found it was more efficient to reason alone than in groups. One might naturally conclude that in so far as there is no correlation between mental ability measured by intelligence tests, and motor ability measured by a battery of motor tests, neither would we expect to find a test of the nature given in this experiment to correlate with a test of reasoning. Since the experiments mentioned above do not exactly meet the conditions set up in this one, naturally the results would not agree. However, there is a definite trend in this test that suggested future investigation.

CONCLUSIONS

This experiment suggests the possibility of a test to measure temperament in connection with adaptability to athletics. The test used here may not be suitable for such a diagnostic or predictive indication of the individual's competitive temperament. However, it indicates the possibility of predicting the competitive ability by a more refined test yet to be worked out. Such a test must be devised and then given to a large number of individuals who have proved themselves in real situations to be poor and good competitors. With this validation as a basis norms or standards of comparison can be calculated. It is apparent from the results of this experiment that there is some measurable difference in the competitive ability of an individual.

In most of the tests used in the classification of students in physical education or in general education there seems to be little or no recognition of social facilitation in the administration of the test. As the results of this experiment show an appreciable difference in the scores recorded by different individuals under the three sets of conditions, some account

[3] An unpublished thesis. Ben Herron, State College of Washington, Pullman, Washington.

should be taken of the manner of administration of tests in order to control its competitive features.[4]

Some individuals may see in this experiment a gate opening into a field offering a better opportunity to increase the reliability of administrative tests such as the P.F.I. in physical education. While the testing routine described in this report is a crude attempt to measure something heretofore unmeasured, it may open the way to a more refined product that will in some sense measure the individual's adaptability to highly competitive motor activities. Such a test may be of particular advantage, too, in the development of athletic training procedure. Not only will it enable the coach to understand better the attitudes and performances of his players, but he will know to what extent he can depend upon a given player in the "tight" situations.

CONDITIONS FOR FUTURE STUDY

Many refinements of the above study are possible. The organization of parallel groups to be tested over a given length of time by a series of tests under the same conditions as outlined in this study is one alternative. It is also imperative that a more finely scaled instrument be used. A larger number of individuals would also improve the validity of the results. Other tests of validity would be necessary. For example, a number of individuals might be rated according to their competitive ability by members of athletic coaching staffs and physical educators and then tested by a battery of tests under different psychological stimuli, and results correlated.

[4] This has already been done for P.F.I. tests. (Ed.)

A Comparative Study of Three Methods of Measuring Flat and Weak Feet*

By Harold R. Danford

INTRODUCTION

THIS study was undertaken for the purpose of comparing the three most commonly used methods of measuring weak and flat feet, and determining the practicability of the use of the *pedorule* for measuring degrees of flatfootedness.

Next to carious teeth the most common and widely spread forms of physical impairment among the civilized people of today are disorders of the feet. According to Bancroft [1] from 57 to 61 per cent of cases of flat feet become serious enough to be discovered between the ages of ten to twenty-five which shows that young people need special training in the hygiene of the foot during this time, when the neuro-muscular system is immature, and weight is rapidly increased.

Another writer [2] found in examinations of school groups and army recruits that the per cent having true flat feet or sunken arches will average from 6 to 13 while those having weak (but not flat) feet will average from 73 to 78 per cent.

These are real problems for physicians and physical educators in their corrective work, not only in the actual building up of weak and fallen arches, but in their prevention. The most challenging angle to the situation is that the percentage of incidence of weak and flat feet is increasing rapidly.

An examination of present methods of determining weak and flat feet was made in a corrective class. Several cases were called to the writer's attention, in which subjects had been placed in the corrective class "to remedy flat feet" when in reality the subjects merely had "normally" low arches.

These experiences suggested the need of a measure, ***not of the height of the arch itself, but of the position of the foot in relation to the leg.*** To meet this need the *pedorule* was devised. This instrument, in the hands of trained testers, was found to be a valid, reliable, and economical method of measuring weak and flat feet.

This report gives a brief description of three methods of measuring foot conditions and their relative validities.

---

* This report is a summary of a Master's Thesis, submitted to the Boston University School of Education in 1934.

[1] Jessie H. Bancroft. *The Posture of School Children.* New York: The Macmillan Company, 1913.

[2] George T. Stafford. *Preventive and Corrective Physical Education.* New York: A. S. Barnes and Company, 1930.

THREE MEASURES OF FOOT CONDITIONS

1. **Subjective Estimates of Examiners.**—This method is doubtless the most widely used in American schools today, the examiner judging the foot subjectively by his own particular method. Following are some of the methods used:

a) Examining the tendon of Achilles to see if it is bowed in.
b) Observing the malleoli and judging their position.
c) Having the subject walk, or stand on one foot.
d) Observing and judging the arch itself, often by placing one or two fingers under the longitudinal arch.

Any or all combinations of the above may be used.

2. **The Pedograph, and Other Methods of Measuring the Ground Plan of the Foot.**—(*a*) The pedograph ranks next to the subjective judgment of examiners in popularity of use. It is a machine which takes an imprint of the ground plan of the foot.

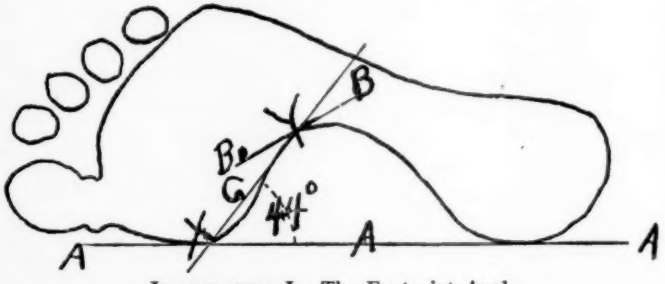


ILLUSTRATION I.—The Footprint Angle

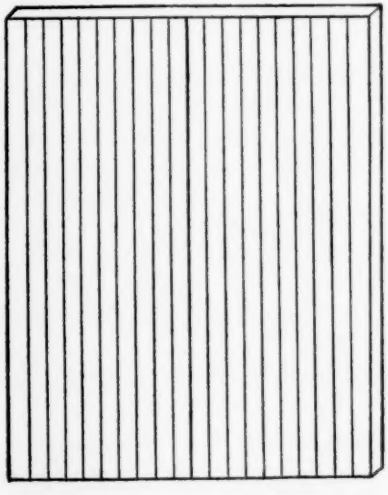


ILLUSTRATION II.—The Pedorule

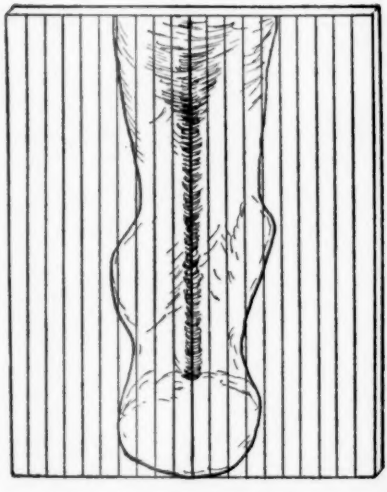


ILLUSTRATION III.—The Pedorule in Testing Position, Showing a Normal Arch—Pedorule Reading Zero

The first attempt to measure footprints was made by Schwartz [3] who originated the footprint angle. This angle is the chief mathematical measure of foot conditions available from footprints. One method of scoring the footprint is shown in the above illustration.

Instructions for scoring footprints by the pedograph: [4]

a) Draw line "A" to represent the medial border of the foot between the points of the imprint at the base of the first metatarsal bone and the calcaneus.

b) Draw line "B" to represent the slope of the inner segment of the longitudinal arch at its junction with the metatarsal border of the arch.

c) Locate points "X" and "Y." "X" is located at the point where line "A" first touches the imprint. "Y" is located at the point where line "B" first touches the metatarsal border of the arch.

d) Draw line "C" between points "X" and "Y." This line is intended to represent the slope of the metatarsal border of the longitudinal arch.

e) Measure the angle at the junction of the lines "A" and "C" with a protractor.

(*b*) Another method of judging the ground plan of the foot is to have the subject walk barefooted on a dusty floor. If the inside of the foot at the bottom of the instep has become dusty, it is a fair indication of the presence of flat foot. A variation of this plan is to judge the print left on the floor by having each subject slightly dampen his feet and then step on the dry floor.

3. The Pedorule.—This instrument is a rectangle of heavy plate glass, seven inches wide and nine inches high, with the surface parallel-lined in tenths of inches. ***This pedorule was devised to measure the amount of deflection of the tendon of Achilles from the perpendicular.*** Williams [5] observes "The swelling and fullness along the inner side of the foot are accompanied by a bending inward of the tendon of Achilles. In the normal foot the tendon of Achilles makes a straight line, but in a weak foot the lower end appears to be deflected outward."

a) When the pedorule is placed immediately behind the foot to be measured, two points must be established by ink marks: first, ***the mid-point of the tendon of Achilles as high on the calf of the leg as possible***; and second, ***the mid-point of the back of the heel.***

b) The center line of the pedorule (which for convenience should be colored) should then bisect these two ink marks, on a normal foot.

c) In taking observations one eye should be closed; and the other should be in position approximately twenty-four inches directly behind the center of the pedorule.

d) From here three readings can be made; first, ***from the extreme tip of the external malleolus to the center of the tendon***; second, ***from the internal malleolus to the center of the tendon***; and third, ***the distance from the center of the tendon to the center line of the pedorule.*** (The center line of the pedorule will coincide with the center line of the tendon of Achilles if the arch is neither flat nor weak.)

---

[3] Lows Schwartz, R. H. Britten, and L. R. Thompson. *Studies in Physical Development and Posture*, p. 23, No. 179. United States Public Health Bulletin, 1928.

[4] H. Harrison Clarke. "An Objective Method of Measuring the Height of the Longitudinal Arch in Foot Examinations." RESEARCH QUARTERLY IV: 3 (October, 1933).

[5] Jesse Feiring Williams and Whitelaw Reid Morrison, *A Text Book of Physical Education.* Philadelphia and London: W. B. Saunders Company, 1931.

A second method of determining flat-footedness by the pedorule is:

a) To place the center line of the pedorule directly behind the center of the tendon at the point where it is bowed inward the farthest.

b) Counting the number of lines from this point to the tips of the malleoli and subtracting the distance from the tendon to the internal malleolus *from* the distance from the center of the bowed-in tendon to the external malleolus.

c) The distance that the tendon of Achilles deviates from the perpendicular will thus be found.

After experimenting with both methods, the writer has found that the latter method is less confusing and more efficient. The perfect foot would be "zero," thus showing the tendon to be equidistant between the malleoli throughout its entire length.

STATISTICAL ANALYSES

Objectivity.—The objectivity coefficient between experts using subjective judgments was found by the writer to be .58. Of course, this coefficient indicates a serious lack of objectivity, but it may be considered *relatively* high as a coefficient of correlation between subjective examiners, since it agrees closely with the results of an experiment performed by Franzen in 1929.[6] Franzen averaged the correlation coefficients between the judgments of various physicians measuring the nutritional status of children. Their average was .60.

Reliability.—No reliability coefficient was determined for subjective judgments of foot conditions. The reliability coefficient of foot conditions of the pedograph as computed by H. Harrison Clarke was found to be .97, while the objectivity coefficient was found to be .95. The reliability coefficient of the pedorule was found to be .94.

Norms.—Norms for the footprint angle are as yet not well established. Schwartz[7] found that by his method the average angle was "about 45 degrees," while Rogers[8] estimated it to be 40 degrees after examining 300 prints taken from a highly selective group of high school and college students and securing a median of 43 degrees.

Validity.—The validity of the footprint angle as a measure of true weak or flat feet is open to serious question. Quoting from *Hygeia*, September, 1932, "A footprint will indicate whether or not the arch is flat, but weakness of an arch may be present even when the imprint is normal. A strong, fleshy foot may produce an imprint suggesting a flat foot."

Williams and Morrison[9] say, "Feet vary in their shape like other parts of the body; in some the arch is higher than in others. Occasionally the arch may be extremely high or low and still be normal. Much

---

[6] J. Raymond Franzen, *Physical Measures of Growth and Nutrition*, Chapters I-III. New York: American Child Health Association.

[7] Lows Schwartz, R. H. Britten, and L. R. Thompson. *Studies in Physical Development and Posture*, p. 23, Number 179. United States Public Health Bulletin, 1928.

[8] Frederick Rand Rogers. *Fundamental Administrative Measures in Physical Education*, page 156.

[9] Jesse Feiring Williams and Whitelaw Reid Morrison. *A Textbook of Physical Education*. Philadelphia and London: W. B. Saunders Company, 1931.

more important than the height of the arch is the position of the foot in relation to the leg." In view of these statements, easily verified by observation and the unanimous opinions of orthopedists, a study of correlations between various forms of testing feet should be significant, ***if only to demonstrate the present lack of proved validity of any measure.***

TESTS OF VALIDITY

1. The testing for this study was conducted at the Boston University Gymnasium. The subjects were sixty in number and were members of three University male physical education classes.

2. Each of the three methods of measurement mentioned above was followed. Great care was exercised to keep the results of each examiner and examination secret from each succeeding examiner so that he would not be influenced in his judgments. To accomplish this more effectively, examiners were placed about the gymnasium twenty-five feet apart, in the following order: first, subjective examiner number one; second, subjective examiner number two; third, the pedorule; and fourth, the pedograph.

3. Each of the examiners, except the pedograph operator, recorded his findings, with the subject's name, on a three-by-five-inch card. These cards were kept by each examiner and the subjects went on to the next examiner where the same procedure was followed. The pedograph prints were used for records of these tests.

4. Subjective examiners were asked to place each foot in one of five categories, the first group being the perfect arch, then varying the degrees of flat feet, as "Two," "Three," "Four," and "Five," which was the extreme flat-footed group.

5. Recordings of examinations of the pedorule were made in tenths of inches. The reading of zero on the pedorule signified the perfectly perpendicular tendon of Achilles and a normal arch.

6. The method used in scoring footprints by the pedograph was the same as that so ably described in an article by H. Harrison Clarke[10] of Syracuse University.

7. Correlation coefficients were calculated:

a) Between the two subjective examiners.
b) Between each of the instruments.
c) Between each of the instruments and the examiners.

STATISTICAL RESULTS

1. Unfortunately, no objective or subjective criterion of validity is available to check the validities of the various methods studied. Therefore, intercorrelations among the three are reported, with interpretations thereof by the writer.

[10] H. Harrison Clarke, *Op. cit.*

Table I gives the coefficients obtained.

2. Interpretations of coefficients. It was found that a relatively high correlation existed between the subjective examiners and the pedograph. The reason for this is apparent, since in judging subjectively an examiner notes what portion of the foot does not touch the floor and the pedograph print shows nothing except the ground plan of the foot. Therefore, both were, to a great extent, examining the ground plan of the foot without taking into consideration whether or not the foot was normal, or that it had become flattened.

The correlation coefficient between subjective examiner one and the pedorule was .38 while that between subjective examiner two and the pedorule was four points lower. The higher coefficient between subjective

TABLE I

CORRELATION COEFFICIENTS BETWEEN VARIOUS MEASURES OF FOOT CONDITIONS

(60 Cases)

Method	Subjective One	Subjective Two	Pedograph	Pedorule
Subjective Tester one	x	.58	.54	.38
Subjective Tester two	.58	x	.50	.34
Pedograph	.54	.50	x	.30
Pedorule	.38	.34	.30	x

examiner one and the pedorule was due to the fact that he included in his records the position of the tendon of Achilles in relation to the foot.

The coefficient of .30 between the two instruments, the pedograph and the pedorule, shows that they are not measuring the same thing. (An *r* of .30 equals a predictive index of only .046.) The pedograph is measuring the footprint angle, not the height of the arch. The pedorule is measuring the distance the tendon has departed from its normal position which shows how far the arch has flattened.

3. Two extreme cases of disagreement between pedograph and pedorule tests tend greatly to verify the belief that the pedorule is the more valid measuring instrument.

a) A fine example of the low arch type of foot was found in one of the cases of this study, a negro boy, whose footprint angle was eleven degrees for each foot. Both subjective examiners placed his foot in group five, the extreme flat group. His pedorule examination showed zero for both feet. Since there was such a wide disagreement between the results, the writer called the subject into conference for questioning. It was learned that he believed he had fallen arches because he had always been told he had. It was also found that he had never suffered any pains in his feet, legs, or back that could possibly be attributed to flat feet.

b) The other extreme was a boy whose footprint angle was forty-two. One subjective expert gave him a rating of "1" while the other classified him in the second group. His pedorule score was "five-tenths" for his right foot and "four-tenths" for his left. Again, such a marked difference brought this subject to the special notice of the writer. He was asked if he had ever had any trouble with his

feet, whereupon he replied that he could not take hikes, or play basketball, or stand on his feet very long at a time, because of severe pains in his feet, legs, and back. When asked if he had ever had headaches he replied, "Yes, very often."

These two cases are inserted merely to illustrated how, by means of the pedorule, conditions can sometimes be discovered which would otherwise remain undiscovered.

4. The reliability coefficient of the pedorule is .94 determined by retesting ninety feet.

5. The economy of the pedorule testing is very high. The instrument may be home-made. No other costs are involved except for record cards and the tester's time of about forty-five seconds for each subject.

6. It has sometimes been suggested that "to measure both feet of an individual is a waste of time." It was found in this study that an average of a large group of feet would show the results not differing more than two or three pedorule points. However, in some cases the right foot might be very flat while the left foot was nearly perfect, and vice versa. Thus "measuring only one foot," would be a highly improper procedure.

Rogers reports a correlation coefficient of only .28 between right and left feet.

7. In this study it was found that the greater the bowing-in of the tendon the flatter was the arch (though of course arches were often recorded as flat by pedograph when tendons were not bowed-in). An extreme case showed the tendon of Achilles bowing-in nine-tenths of an inch from the perpendicular. The arch in this case was quite flat and the case was clearly one of "flat-foot."

8. The writer believes, from his brief experience with the pedorule that it is a more valid measure than any yet found to classify pupils for special activities to correct foot conditions. Of course, the number of cases is too small for authoritative statements. The writer is now gathering these and proposes to report results of further experimentation in 1936.

Advantages of a New Shadow-Silhouettograph Over the Original

By C. H. Hubbard

THE SILHOUETTOGRAPH as a means of testing posture or body mechanics, as developed by Mr. Norman Fradd of Harvard University, is, in the writer's judgment, the best so far devised for the purpose. But the silhouette blots out many significant features of body form which ought to be recorded. Of course, examinations of any kind in any field are worth the time spent in giving them only when results show what one is trying to test. If the examination does not do this, then something is wrong with the technique of testing, or the measuring tool is at fault. At Arnold School in Pittsburgh the writer, with the advice of Dr. Blumer of the Children's Clinic of Sewickley, experimented with a system of lighting which seems to have made the silhouettograph considerably more valuable as a means of recording and measuring body mechanics.

The new type of silhouettograph, described hereafter, was brought about merely by the use of additional lighting devices placed in front of the screen. The actual silhouette is maintained, but in addition there is sufficient light thrown upon the subject so that a shadow picture is possible even on the cheap and quickly developed sensitized paper medium used for silhouettographs.

An important advantage of this type of silhouettograph is the time saved in tabulating the orthopedic record of the individual. The new shadow-silhouettograph is sufficiently clear for the examiner to measure and record findings on the examination card at his leisure and thus save the detailed measurements usually made at the time the individual is being examined. The shadow-silhouettograph then can remain in the files for later study and action.

ADVANTAGES OF THE NEW SHADOW-SILHOUETTOGRAPH

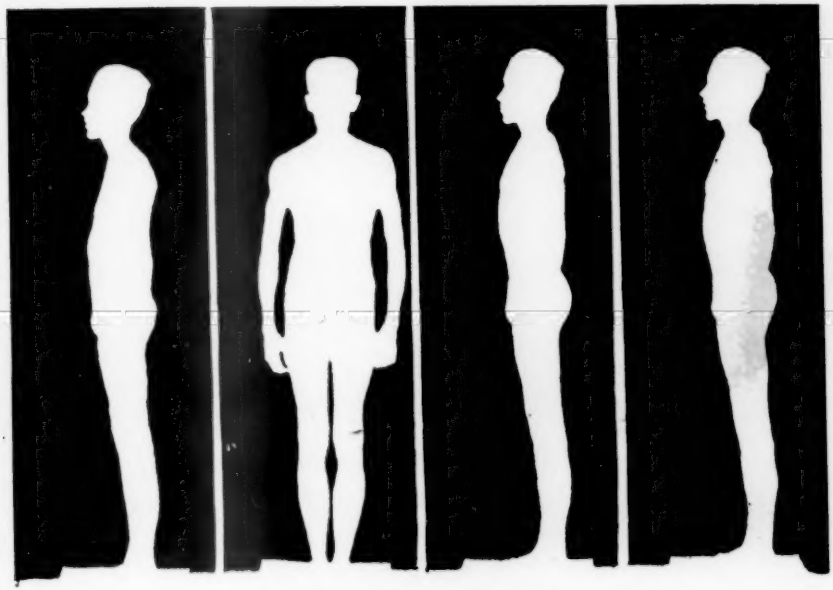
The new and the old type silhouettograph as well as a photostat of the new type are illustrated herewith. The advantages of the new type include the following:

1. The difference in height of the shoulder blades is clearly shown.
2. The direction of the spine is portrayed without special marking.
3. Muscular development is easily seen.
4. A check on the pronation of the feet is made possible.
5. Negatives which will respond nicely to photostatic reproduction and enlargement are available in case there is need for further and more detailed study of the individual.

6. This new method makes it possible to place markings on the body at special places with red grease paint crayons for the purpose of securing better check on alignments, etc.

7. The writer plans to make a further check on the strength of the arches by markings on the foot to indicate the so-called "pedal tripod."

With these possibilities the new shadow-silhouettograph should eventually contribute a wealth of accurate data to check not only the posture



OLD-TYPE SILHOUETTOGRAPH

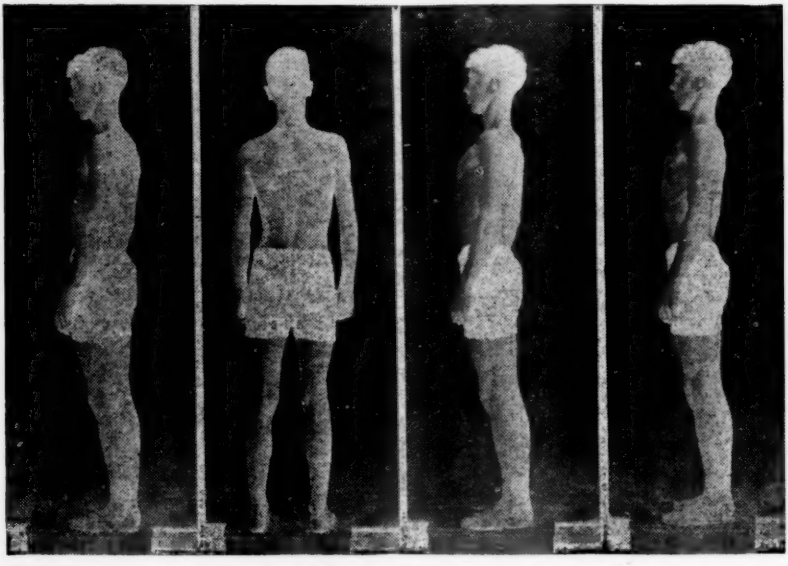
of the individual, but also the muscular development, the body mechanics and even the foot mechanics. The latter alone may be a significant contribution to physical educators who have sought some device to record significant data relating to foot strength.

PLACING OF LIGHTS, ETC.

1. The battery of lights responsible for the more detailed picture is divided into two parts, one on each side of the subject. These lights are fastened on standards which are hooded carefully by screens and adhesive tape over cracks so that light will not be admitted into the camera. Three 200-watt lamps are evenly spaced in a vertical line on each upright standard. Standards are painted white so that as little light as possible will be absorbed by them; and practically all of it thrown upon the subject. They are also raised sufficiently high off the floor to illuminate the subject from head to feet.

2. The old method required a 1000-watt lamp in back of the screen. To this we have added a 500-watt lamp and used it to throw more light down to the region of the ankles and arches. The 1000-watt lamp and

SHADOW SILHOUETTOGRAPH



SHADOW SILHOUETTOGRAPH

500-watt lamp are added to the six 200-watt lamps used on the standards in front of the screen. These require an extra-heavy fuse unless the load is divided between two power lines.

3. The camera is placed ten feet in front of the screen. The subject stands directly in front of the screen. The standards of lights are placed three feet in front of the subject and a little to each side so as not to obstruct the view of the subject from the camera.

4. The material used in the new type silhouettograph is exactly the same as used in the original, namely, 5 x 7 inch photographic printing paper.

5. The time required to take and develop pictures is also the same as for the old-type silhouettograph.

6. We have taken about a thousand pictures with this new method. These pictures are uniform throughout.

ATTITUDES OF PARENTS AND OTHERS

The subject's parents are very much impressed with any type of posture study, but are especially pleased with this method, as it so nearly approximates the photograph and thus makes it possible for the instructor to speak to parents with positive assurance concerning body mechanics. Administrators and trustees are also much pleased with the method. One of our trustees recently remarked, concerning the new type silhouettograph, that *"its value was evidenced by the pleasing display of good carriage exemplified by the boys in the senior class at graduation time."*

This new-type picture, while not quite as clear as a photograph, is considerably cheaper; and the time element required in finishing pictures is also worthy of comment as there is but one operation necessary. In other words, there is no film or plate used, which eliminates the time and expense required in preparing these for printing. As mentioned before, enlarged photostats can be made in case more detailed pictures are wanted.

Methods of Procedure in the City

Comprehensive School Health and Physical Education Surveys*

By John M. Harmon

THIS dissertation is a report of research in setting up check lists or score cards to be used in surveying the efficiency of a high school department of student health, physical education, and athletics. These score cards should be most useful in frequent self-surveys. In application they resemble the widely used Strayer and Engelhardt school building score cards.

The writer has reviewed most of the school survey reports and learned that methods of procedure in the school health and physical education survey have been very subjective. There has been no indication of a trend towards improved methods in such surveys.

The writer secured the cooperation of prominent leaders in the field as follows: women supervisors and administrators of physical education, thirty-six; men supervisors and administrators of physical education, seventy-three; school health administrators, twenty-seven; and athletic directors, fifty-two. The geographical location of these leaders, as indicated by spot maps in the report, indicates that every section of the United States is well represented.

The writer prepared an outline for the score card and sent it to these leaders who were requested to evaluate every item by the distribution of an arbitrary number of 2000 points. After assembling these data the median score was determined for every item in the outline, this being the most defensible method of determining group judgment.

The outline forwarded to leaders included, as page one, a request for the leader to indicate the relative potential value of school health service, physical education, and inter-school athletics in the elementary school and likewise in the junior and senior high schools. This served to orientate the leaders to the material at hand and it also gave some very interesting data in terms of median percentages. These results are here outlined in table form.

From reports of experts a complete score card to survey school health and physical education programs was made up. One part of this score card is reproduced below.[1]

In interpreting the score cards, note that column one is added and

---

* Abstracted from the author's Ed. D. dissertation at Indiana University, 1932.

1 Complete copies of this score card, including fifteen sheets, may be obtained for 25 cents each postpaid by addressing the author at Boston University. (Ed.)

TABLE I

THE RELATIVE POTENTIAL VALUE OF THREE PHASES OF THE SCHOOL PROGRAM AS INDICATED BY FOUR DIFFERENT GROUPS OF SCHOOL ADMINISTRATORS AND SUPERVISORS*

	Elementary school				Junior High school				High school			
	Median				Median				Median			
Phases of the program	Athletics	Health	Boys Phys. Ed.	Girls Phys. Ed.	Athletics	Health	Boys Phys. Ed.	Girls Phys. Ed.	Athletics	Health	Boys Phys. Ed.	Girls Phys. Ed.
School health service	50	60	45	50	35	50	40	40	25	50	30	35
Physical education	40	40	50	50	45	40	50	50	40	35	45	45
Interschool athletics	10	0	5	0	20	10	10	10	35	15	25	20

* Table I should be interpreted as follows: In column one of the median scores, "athletics" refers to the scores as determined by the athletic administrators. In column two "health" refers to the scores as determined by the school health administrators. In column three "boys, P.Ed." refers to the scores as determined by the men supervisors and administrators of physical education. In column four "girls, P.Ed." refers to the scores as determined by the women supervisors and administrators of physical education.

carried forward to column two; likewise, column two is added and carried forward to column three, and this column is added and carried forward to the final column. The score opposite every item in the outline is a maximum score to be credited for meeting the standards indicated in full. In using the score card, the evaluation for every item would range from zero to this maximum score indicated.

A SCORE CARD FOR EVALUATING HIGH SCHOOL ATHLETIC PROGRAMS FOR BOYS

	1	2	3	4
I. The Daily Practice				650
A. Average daily, weekly time that should be given to practice			300	
1. Football		90		
a. Monday practice—75 minutes	12			
b. Tuesday practice—120 minutes	18			
c. Wednesday practice—120 minutes	25			
d. Thursday practice—120 minutes	20			
e. Friday practice—60 minutes	15			
2. Basketball		80		
a. Monday practice—60 minutes	14			
b. Tuesday practice—90 minutes	15			
c. Wednesday practice—105 minutes	20			
d. Thursday practice—90 minutes	16			
e. Friday practice—40 minutes	15			

	1	2	3	4
3. Baseball		70		
a. Monday practice—90 minutes	13			
b. Tuesday practice—120 minutes	14			
c. Wednesday practice—120 minutes	20			
d. Thursday practice—105 minutes	13			
e. Friday practice—60 minutes	10			
4. Track and Field		60		
a. Monday practice—60 minutes	10			
b. Tuesday practice—90 minutes	15			
c. Wednesday practice—90 minutes	15			
d. Thursday practice—60 minutes	12			
e. Friday practice—30 minutes	8			
B. Average daily, weekly division of practice			350	
1. Football		150		
a. Fundamentals—M-38, Tu-54, W-36, Th-42, F-15*	60			
b. Scrimmage—M-00, Tu-24, W-48, Th-30, F-00	30			
c. Signals—M-19, Tu-30, W-24, Th-36, F-30	35			
d. Lecture—M-19, Tu-10, W-12, Th-12, F-15	25			
2. Basketball		100		
a. Fundamentals—M-30, Tu-45, W-42, Th-36, F-18	40			
b. Scrimmage—M-6, Tu-23, W-42, Th-18, F-00	30			
c. Signals—M-9, Tu-14, W-11, Th-18, F-10	15			
d. Lecture—M-15, Tu-9, W-11, Th-9, F-12	15			
3. Baseball		100		
a. Fundamentals—M-54, Tu-48, W-42, Th-42, F-33	50			
b. Practice game—M-00, Tu-48, W-60, Th-42, F-00	30			
c. Signals—M-14, Tu-12, W-12, Th-11, F-12	10			
d. Lecture—M-23, Tu-12, W-6, Th-11, F-15	10			
II. The Game				400
A. For Winning all Games			60	
1. For winning 90% of all games		60		
2. For winning 80% of all games		60		
3. For winning 70% of all games		60		
4. For winning 60% of all games		55		
5. For winning 50% of all games		50		
6. For winning 40% of all games		45		
7. For winning 30% of all games		40		
8. For winning 20% of all games		35		
9. For winning 10% of all games		25		
B. Morale of Team			105	
1. All of the squad are enthusiastic in supporting the school, the coach, the other faculty members, and team-mates		43		
2. The teams go into the featured games keyed to a high pitch, and do not let down unexpectedly for intervening games		10		
3. The teams go into all games in a spirit of recreation, but seem to give their very best ability		27		

* M-Monday, Tu-Tuesday, W-Wednesday, Th-Thursday, F-Friday. The numbers following the days of the week refer to minutes of practice.

	2	3	4
4. The team members are exceedingly enthusiastic in victory	3		
5. The team members, including the captain, always accept the judgment of officials in the game	22		
C. Coach's methods of teaching the game		110	
1. When criticism is necessary, it is constructive in nature	40		
2. Demonstration and explanation, execution by player or team, correction by coach	25		
3. The dressing room conference just before games and between halves is used exclusively to teach in a quiet way	25		
4. A combination of methods 1 and 3, which leaves out the word exclusively in 3	20		
D. Attitude of the coach during the game		65	
1. The coach makes all substitutions	20		
2. The coach supports the officials in all decisions during the game	20		
3. The captain may ask for substitutions	5		
4. The coach remains completely obscure during the game, except when the health of his players seems to demand his attention, or other duties call him	10		
5. During the game the coach's time is given to quiet teaching of the game being demonstrated, with the substitutes as his class	10		
E. Medical attention and service (A physician should be at every game ready to treat injuries)		60	
III. Personal contact of coach with players and community			400
A. Individual coaching conferences with every team member during the season (f.b.5, basket b. 5, base b. 4, and track 4)		175	
B. The coach makes many social and civic contacts in the community		100	
C. The coach makes many social contacts with his players		50	
D. The coach is very active in extra-curricular activities, other than athletics		75	
IV. Business Management of Athletics			250
A. The coach keeps an individual accumulative record of each player, which includes his performance record and other vital data		50	
B. The salary of the coach is paid in full from the same source as that of other teachers		50	
C. Games are scheduled by the director of athletics		30	
D. Athletic moneys are handled and controlled by the faculty athletic manager		40	
E. Athletic equipment is purchased by the director of athletics		25	
F. Game officials are hired by the director of athletics	25		
G. Athletic finances are budgeted a year in advance		30	
V. Sanitation of, and Mental Hygiene in the Dressing Room			300
A. Dressing rooms are cleaned perfectly after every day's use		65	
B. The janitor is a full time employee, and not hired by the hour		50	
C. The boys have a sense of responsibility for the equipment, which they do not try to avoid		60	
D. Stealing of the other fellow's equipment is not a problem		40	
E. There is a spirit of cooperation in the use of equipment and facilities		55	
F. Profanity is seldom heard in the dressing room		30	

CONCLUSIONS AND RECOMMENDATIONS FROM ANALYSES OF REPORTS

1. The topic of school health and physical education has been neglected in the school survey.

2. Most surveys that have included physical education and health have resorted to a subjective review of the program as the major method of procedure.

3. More than one-fourth of the city school surveys have omitted entirely school health and physical education.

4. The chief recent development in methods of surveying school health and physical education programs is the use of health knowledge tests.

5. Some of the most valuable methods of procedure have been omitted during the last ten or more years.

6. There is a need for standard procedure in the city school health and physical education survey.

7. School health programs have been given more attention than physical education in city school surveys.

8. There has not been a trend towards improvement in methods used in city school health and physical education surveys during the last ten years.

9. City school health and physical education surveys were just as comprehensive previous to 1918 as they have been since that time.

10. Most of the methods used in city school health and physical education surveys have been very subjective.

11. Many items have been overlooked in the school health and physical education survey.

12. The athletic administrators, the school health administrators, and the physical education administrators consider their own program of greater potential value than it is judged to possess by either of the remaining two groups.

13. Interschool athletics should not be included in the elementary school program.

14. The interschool athletic program in the junior high school should be a very limited program, amounting at the most to only one-sixth part of the physical education program.

15. In the high school the interscholastic athletic program should be about one-third of the physical education program.

16. Upon the basis of the judgment of the juries of experts cooperating in this study, a school corporation would be justified in dividing its budget for the school health and physical education program, in the twelve grades, upon the following basis: 12 per cent to interschool athletic programs, 48 per cent to the remainder of the physical education program, and 40 per cent to the school health program.

17. A group of fifty-eight leading school athletic administrators have

indicated that they believe that the winning of games is of minor importance in comparison with many other results in the athletic program.

18. In measuring the efficiency of a high school athletic department, the proper procedure in the daily practice of the major sports is of more importance than the way in which the game is conducted, and the winning or losing of games.

19. The personal contact of the coach with the players and the community is of more importance than the winning or losing of games.

20. The sanitation of and mental hygiene in the dressing-room is of more importance than the winning of games.

21. The proper business management of athletics is of more importance than the winning of games.

22. The length of the daily football practice is of more importance in high school programs than the winning of games.

23. The time allotment, or limiting the daily basketball practice, is of more importance than the number of games won.

24. The time allotment to baseball practice is of more importance than the number of games won.

25. The proper division of the daily practice time in football to fundamentals, scrimmage, signal practice, and lecture is of more importance than the percentage of games won.

26. The proper division of the daily practice time in basketball to fundamentals, scrimmage, signal practice, and lecture is of more importance than the percentage of games won.

27. The proper division of the daily practice time in baseball to fundamentals, practice game, signals, and lecture is of more importance than the percentage of games won.

28. The moral conduct of the team is of more importance than the number of games won.

29. The coach's methods of teaching the game are of more importance than the percentage of games won.

30. The attitude of the coach during the game is of more importance than the percentage of games won.

31. It is of more importance that the coach have four or five individual office conferences with every member of his squad during the season than that they win games.

32. It is of more importance that the coach make many social and civic contacts in the community than that his teams win games.

34. It is of more importance that the dressing rooms be cleaned perfectly after every day's use than that the team win games.

35. In the school health program, it is of more importance that a good health education program be a part of the curriculum in every grade than to maintain a good follow-up program in health service.

36. The health education program is of more importance than the discovery and correction of physical defects.

37. Both the discovery of and correction of the physical defects of pupils and the follow-up program are more important than the type of organization in the department, the control of communicable disease among pupils, or the supervision of the health of teachers. This conclusion is probably true only when perfection of the ideal is being compared with the average program.

38. It is of more importance that an ideal staff be organized for pupil health service than that the health of teachers be supervised.

39. It is of more importance that an excellent program in the control of communicable disease be maintained than that the health of teachers be supervised.

40. It is of more importance that special classes for the defective be maintained where needed than that a program of morning inspection for all pupils be carried out.

41. It is of more importance that health education have a place in the curriculum for every grade than that a program of daily morning inspection be carried out.

42. It is of more importance that parents be sent a written report of the physical defects of pupils, and advised relative to the best procedure, than that health education have a place in the curriculum for every grade.

43. The placing of health education in the curriculum of every grade is of more importance to the pupil than the immunization of all pupils against diphtheria, smallpox, typhoid fever, and scarlet fever.

44. The factor of regular visits to the homes by the school nurses is of more potential value than the immunization of all pupils or the health education class in the curriculum.

45. The instructional staff, their training, and other qualifications are more vital in a good physical education program than any other consideration in the program.

46. The facilities for physical education, the program organization, and the program of activities are of equal importance to good results.

47. The professional assistance to teachers is of more importance than any single item other than those items mentioned in conclusion numbers 45 and 46.

48. The kind of training the teachers of physical education have had is of more importance than the extent of their training.

49. The physical fitness of the physical education teachers of boys is of equal importance to the extent of professional training they have had.

50. Training in the technique of the many games and other activities is of more importance than any other type of training.

51. One year of professional training in addition to a master's degree in physical education is indicated as the maximum standard of training for men teachers of physical education.

52. The recency of training of teachers is very important even in comparison with the kind and extent of training.

53. The personality and character of instructors is of more importance than the extent of training.

54. The kind of training and the personality and character of instructors is of equal importance.

55. Their efficiency in teaching is of more importance than the extent of training that teachers may have had.

56. Ample play space is of more importance than any other provision in facilities for physical education.

57. Outdoor facilities are of more importance in physical education for high school boys than are indoor facilities.

58. The most important item among the indoor facilities is the playing floor.

59. The most important single item among the outdoor facilities for boys is the baseball diamond.

60. The most important item of equipment in the gymnasium for boys is mats.

61. It is of equal importance that all pupils be enrolled in physical education classes and that they be examined annually for physical defects.

62. A class of forty pupils is accepted as the standard-size class in physical education.

63. In corrective physical education work the classes should have twenty or fewer pupils.

64. Sixty minutes daily for high school boys is accepted as the best standard in time allotment for physical education.

65. A large variety of activities in both the physical education instructional period and in the intramural program is one of the most important responsibilities of the physical education teacher and administrator.

66. Efficient supervision of instruction is worth as much to a physical education program as excellent library service in providing ample books and professional magazines.

67. In the girls' physical education program, the indoor facilities are more important than the outdoor facilities.

68. A varied program of activities is just as important in a physical education program for girls as in a program for boys.

69. A college degree in physical education is accepted as the maximum need for training of teachers in physical education programs for high school girls.

70. Basketball, handball, tennis, volleyball, etc., courts are more important outdoor facilities than any other type of facilities for physical education programs for girls.

71. Interscholastic athletics for girls should not be promoted.

72. Interschool athletics should not be a part of the elementary school program.

73. All elementary school teachers should be trained in health and physical education.

74. Special teachers of physical education in the elementary school should receive at least two years of special training in health and physical education.

75. Time allotment in physical education in elementary schools should be at least thirty minutes daily in addition to the free play periods before school, at recess periods, and after school.

76. Most important in facilities for the elementary school physical education program is ample play space. A good teacher with ample time allotment provides other essentials to a good elementary school physical education program.

77. Most important in activities for the elementary school physical education program is that 100 per cent of the pupils take part in a large-muscle activity program daily.

The Backboard Test of Tennis Ability

By Joanna Thayer Dyer

THE BACKBOARD Test has been designed to measure ability in tennis for classification purposes. It consists in rallying a tennis ball against a backboard, trying to score as many hits as possible in the time limit of 30 seconds. Accuracy and speed, the two prime requisites of tennis skill, seem to be basic, in about equal degree, to success in the test. It is simple in administration, equipment, and scoring. A group of about 30 players may be tested and scored in an ordinary 30-minute period. Both validity and reliability correlation coefficients of .90 or above have been found for this test.

The Backboard Test was constructed, and the first experiment made, with a group of 13 graduate women students at Teachers College, Columbia University in the Spring of 1932. During the Spring of 1934 the most complete and comprehensive experiment was carried out at the North Texas State Teachers College involving 39 cases. In between, several other experiments were made involving a total of 736 cases in all.

ADMINISTRATION OF THE BACKBOARD TEST

A. Equipment.—1. Backboard or wall, approximately ten feet in height, and allowing about fifteen feet in width per person taking the test at one time. Two players taking the test at once has been found to be a very satisfactory arrangement. This allows for adequate supervision by the administrator.

2. On this wall a plainly visible line three inches in width, to represent the net should be drawn so that the top is three feet from the ground.

3. A starting line, twenty feet from the base of the wall, should be drawn on the floor.

4. Stop watch with second hand.

5. Two balls and a racquet per player. It is desirable that the balls be in good condition, although it is not essential that they be exactly new. The racquet should be without flaws.

6. One pencil per group of four players.

7. Score card per player. (See sample below.)

B. Organization.—Divide the group to be tested into units of four players each, and number them from one to four. Provide each player with a score card on which she writes her name. The following description of the test is then read to the group.

"The Backboard Test consists in rallying a tennis ball against the wall. The object of the test is to cause the ball to strike the wall on or above the net line as many times as you can in 30 seconds. (Pause) When I say 'Go!' start the test immediately by dropping the ball and putting it in play against the wall. Continue to play it to the wall until I say, 'Stop!' at the end of thirty seconds. There is no limit to the number of times the ball may bounce before you hit it. You may use any stroke or combination of strokes. Each ball striking the wall on or above the net line, before the word 'Stop,' counts as a hit and scores one point. You may use any number of balls. If for any reason you lose control of the ball in play, do not try to retrieve it, but

take another ball and put it in play as at the start. Each extra ball used, *after* the first, on each trial, deducts one point from the total score for that trial. You will each be given three trials. The final score on the test is the sum of the total scores for the three trials. All three trials must be completed in one testing period."

Name .....

Trial	Hits	Balls Used	Score Hits—Balls
1			
2			
3			

Final Score.....

Answer questions and demonstrate if necessary:

1. The starting position and method.
2. What is meant by rallying.
3. What is meant by a ball out of control, showing how the saving of time by taking another ball, instead of trying to recover, equalizes the deduction of one point.

The next step is to read the following paragraph, making certain that each player understands the test procedure and her duties.

"In each group:

"*No. 1* takes the test. At the signal, '*Ready?*,' she steps up to the starting line with her racquet and two balls prepared to start the test at the word 'Go.'

"*No. 2* counts the number of balls which strike the wall on or above the net line, *before* the word 'Stop,' and enters them on the score card in the column headed 'Hits' opposite the appropriate trial number. A ball striking coincident with the word 'Stop' does not count.

"*No. 3* counts the number of balls used, *after the first*, and records the number in the column headed 'Balls Used' opposite the appropriate trial number.

"*No. 4* collects the balls of her group, stands in a convenient place near to, but not interfering with, *No. 1*, ready to supply her with more balls.

"Each person takes the Test in rotation. After *No. 1* has had her trial she assumes the duties of *No. 2* while the latter takes the Test; *No. 3* and *No. 4* remain the same. While *No. 3* takes the Test, *No. 4* scores hits, *No. 1* and *No. 2* assume the duties of *No. 3* and *No. 4* respectively. When *No. 4* takes the Test, *No. 3* scores hits, and *No. 1* and *No. 2* remain the same. After each person in the entire group being tested has had one trial, the Test is repeated in the same order until everyone has had three trials in all."

The foregoing organization consumes about ten minutes. Great care should be exercised in these preliminaries to make certain that the test procedure is clearly understood. The testing will then take place smoothly and accurately.

The Examiner then assumes a position to the rear of the players with the stop watch, and begins testing with all the *No. 1*'s who are to take the Test at one time, usually two in number. *Nos. 2, 3,* and *4* of these two groups will follow, and then the *No. 1* of the next two groups will follow, and so on until all have had one trial,

after which the Test is repeated twice in the same order. In case the group does not divide exactly into groups of four, add a fifth player to a group.

DISCUSSION OF TEST ELEMENTS

1. The backboard was chosen as the medium for the Test because:

a) It represents a constant factor, and therefore any score made would be the result of the player's ability uninfluenced by the relative ability of varying opponents.

b) The Test can be scored objectively.

c) The Test can be administered to groups. The number of players is limited only by the breadth of the wall.

d) Accuracy and speed are probably of the same relative importance in backboard rallying against time, as they are in playing tennis. The objection has been raised that one may practice the Test, and so make a better score on a retest, without increasing her playing ability. The answer is that many tennis instructors and high ranking players use backboard rallying as a means of increasing court efficiency. If their theory is true, then a person practicing against a wall, even for the sole purpose of increasing her Test score would at the same time improve her playing ability.

2. It was found during the preliminary experiments with the Test that if less than 15 feet of wall space was allowed for each player, they interfered with one another. More than 20 feet is unnecessary because of the time wasted in recovering such wide shots.

3. *The 20-foot line is used as a starting point only.* It was tried at first as a restraining line, but experiments showed that players seldom advanced more than a couple of feet closer to the wall because of the speedy rebound. Players may, of course, stand as much further away from the wall as they wish, but since this is in fact to their disadvantage, they rarely do so.

4. The ball is required to bounce at least once at the start to provide the same method of starting for everyone. *No limit is placed on the number of times the ball may bounce before being struck*, because it would not be of advantage to anyone not to attempt to hit it as soon as possible.

5. *No limit is placed on the number of balls used*, because:

a) If only one ball were allowed, some players would lose control of the ball before the time was up, and could not then be compared to those who are able to continue for the whole time.

b) Deducting one point for each extra ball used, plus the loss of time in restarting, cuts down the score in proportion to the lack of skill demonstrated by the necessity for using more than one ball, while still allowing each person to employ the whole time allotted. Minus scores are possible, due to the fact that a player may use more balls than she makes hits. This feature of the scoring adds strength to the Test since there is no

point at which the poorness of ability cannot receive a numerical rating.

6. Any stroke or combination of strokes is allowed because the same holds true in a game. Also, on the principle of keeping the Test as true to the game situation as possible, no measure of form is included. While form is, of course, important in improving one's game, still, no points are given toward winning a match on the basis of form. It is a means and not an end. In rallying against a backboard, as in playing on the court, the player with good form will be likely to have more control and greater speed than will the player with poor form.

7. It was found to be unnecessary to include the restriction that the ball must bounce once on its return from the wall before being struck, since a continuous volley is almost impossible. Several good players, all of whom made scores on the Test above 40, were asked to try a continuous volley. All of them lost control of the ball, or were forced to allow it to strike the floor in order to keep it in play, after one volley.

8. There is no restriction on the height above the net at which a ball striking the wall still counts as a hit, since:

a) In the game itself a ball may cross the net at any height.

b) During experimentation it was observed that balls seldom go higher than five feet, and almost never over eight feet.

c) A ball striking the wall high above the net consumes more time than does a low one. This is obviously no advantage. Therefore, only the player with little control over the ball will so direct it. The resulting low score is a legitimate indication of poor ability. If the ball should go over the backboard, the player would naturally take another ball and receive the penalty of one point for poor placement.

9. During the first experiment with the Test in 1932 each player was given five trials. Correlation coefficients were calculated between the criterion and the following five combinations of scores:

a) First trial.

b) Best score made on three trials.

c) The sum of the scores on three trials.

d) Best score made on five trials.

e) The sum of the scores on five trials.

It was found that three trials were necessary for the player to do herself justice but that more trials gave no better results. Therefore three trials was accepted as constituting the Test.

10. The time limit for each trial was determined after preliminary experiments with other times ranging from ten seconds to one minute. Twenty-five seconds were finally taken as providing a period sufficiently long to allow of best performance, and yet not so long as to involve the element of fatigue. After the first experiment at Teachers College in 1930, those taking part, all graduate students in physical education, were asked to comment on the time limit. Their opinion was that an increase to 30 seconds would strengthen the Test and still not reach the

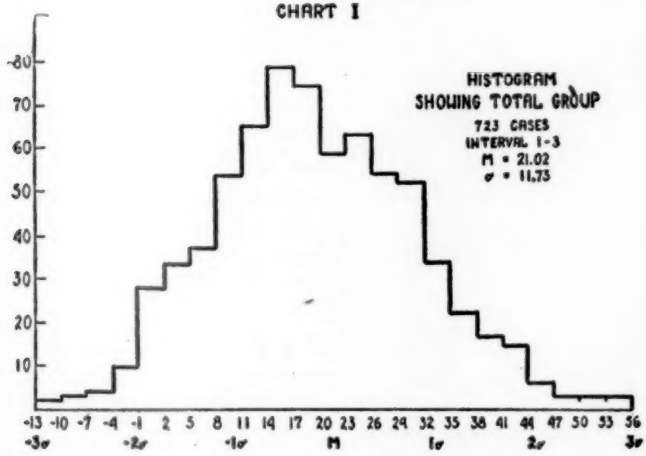
point where fatigue need be considered as a factor affecting the results, and therefore, 30 seconds was adopted as the limit in subsequent experiments.

STATISTICAL DATA AND ANALYSES

A. Total Number of Cases

The study is based on 736 cases, including representative women's tennis groups in 19 colleges. The experiment was begun in February, 1932, and completed in May, 1934. The Test was given as described on page 63 except in the case of the Teachers College group, whose scores are naturally not included. The mean score for the total group is 21.02 for the complete test of three trials for each subject; and the sigma,

CHART I



11.73. The scores range from —11 to +56; and a plotting of the curve shows a normal type of distribution. The base line range is from —3 sigma to +3 sigma. The distribution is shown graphically in Chart I, above.

B. Teachers College Data

At Teachers College, Columbia University, the Test was given to a group of 13 graduate students in the Spring of 1932. The time limit was 25 seconds. The scores range from —4 to +38. Validity was measured by correlation of Test scores with a criterion made from the judgments of three experts as to the playing ability of the subjects, which is considered by Bixler[1] to be the best of the judgments of experts' type. The three scores for each person were averaged, and the group then arranged into a rank order list. A resulting correlation coefficient of .85 was obtained.[2]

[1] H. H. Bixler. *Check List for Educational Research.* Page 49.

[2] Unless otherwise stated the Rank Difference Method of Correlation was used and the values of *r* inferred from Table XX. H. E. Garrett. *Statistics in Psychology and Education,* Page 192.

This group was given five trials on the Test. To obtain a reliability coefficient the sum of trials one and three was correlated with the sum of trials two and four. This grouping of trials was assumed to represent chance halves of the Test, and a Pearson r of .85 was found.

C. Goucher College Data

The second experiment was conducted at Goucher College in the Fall of 1933. The group consisted of 64 cases divided into six sections. The scores ranged from 4 to 55. The criterion used was ranking by one judge, and each section was ranked separately and the group was also ranked as a whole. This criterion is weak, or course, in that it rested upon the judgment of one person only. The r's found are shown in Table I.

TABLE I
CORRELATION COEFFICIENTS
GOUCHER COLLEGE

Group	r
A	.93
B	.96
C	.66
D	.81
E	.95
F	.61
Whole (Pearson r)[3]	.84

D. Mt. Holyoke Data

In the Spring of 1933 the Test was given to 45 students in three groups at Mt. Holyoke College.[4] The scores range from 7 to 40. Three criteria were obtained; semester grade, ranking by one judge, and a rank order list of a group of 15 players, all of whom had participated in a Round Robin Tournament.

The Round Robin Tournament was an experiment itself. It was the outcome of a search for a more objective, and hence a more reliable criterion than the judgment of experts which is necessarily subjective, no matter how carefully done, and to that degree unreliable. The procedure consisted in having each player serve four times to every other person in the group. Whoever won the play scored one point. At the end of the tournament, each player's score was totaled. These total scores formed the basis for the rank order list. As a criterion this technique was weak in that too much depended upon serving skill, and that it was not truly a game situation. Considering the worthiness of the other two criteria, the unreliability of the second has already been noted, and Semester

[3] Clark Hull, "Computation of Pearson r from Ranked Data," *Journal of Applied Psychology*, 6 (1922), 385–390.

[4] The data for Group C, 14 cases, is not included because the correlation coefficient of —.84, Test and Semester Grade, was so far removed from all the other correlation figures as to make it obvious that some mistake in the raw data was present. (Probably the reporters reversed signs of data or method of computing the r, a —.85 r being just as significant as a +.85 r. *Ed.*)

Grade is too much influenced by factors other than actual ability to be considered very desirable. The coefficients obtained are shown in Table II.

TABLE II

CORRELATION COEFFICIENTS
MT. HOLYOKE

Group	*Criterion*	*r*
Whole	Semester Grade	.58
A	Semester Grade	.38
	Round Robin	.65
B	Semester Grade	.70
	Ranking 1 Expert...	.60

E. Eastern Society Data

During the Fall of 1933 the Eastern Society of Directors of Physical Education for Women in Colleges and Universities conducted an experiment in the testing of game skills. The Backboard Test was one of the instruments used. 575 scores were obtained from the data returned by 15 colleges. The scores ranged from —11 to +56. In order to obtain a criterion the instructors giving the Test were asked to rate their students on a 10-point scale. In spite of the fact that a carefully-worded description was a part of the numerical scale, the raw data present many obvious inadequacies. No two instructors seem to have had the same mental picture of the degree of skill for which any one score should stand. Add to this the difficulty of obtaining unified action from about 20 persons who were not located within conference distance, and undependability of this criterion is understandable.

These data yielded 534 cases having a mean score of 18.9, a sigma of 11.25, and a Pearson *r* of .52.

F. North Texas Data

During the second semester of 1934 the Test was given to 39 students at the North Texas State Teachers' College. Of this group 29 were given a retest. The range for the Test was 11 to 53, and for the retest, 14 to 62. Group A, 15 cases, had an interval of about two weeks between testing periods, during which they played tennis about three times a week. Group B, 14 cases, had only a one-day interval. The reliability coefficients obtained from correlating the Test with the retest are: Group A, .90; Group B, .87; Groups A and B combined, .90.

For Group A, two criteria were obtained. Criterion A is a rank order list of the group made by the instructor. Criterion B is based on scores obtained from a Round Robin Tournament.

This was the second attempt to evolve a reliable criterion by this method and is considered by the author to be more valid than any of the others. The technique was changed somewhat from the first time to provide more nearly for a game situation. It was felt that the low *r* obtained with the first technique was in great part due to the fact that too great

a premium was placed on serving ability. As before, each person played every other person in the group. A match consisted of 20 points. A point was won according to the usual tennis rules. The two opponents tossed for service and court. They then played a regulation set, changing serv-

	Ev	Fr	Go	Ko	La	Li	Log	Lor	Mi	Mo	Na	Ne	Pi	Ta	We	Score
Ev		14	9	7	11	11	12	14	17	7	8	4	14	12	13	155
Fr	6		14	2	5	11	6	11	13	7	4	2	11	7	5	104
Go	11	6		8	7	10	4	9	15	4	9	8	7	10	11	119
Ko	13	18	12		11	16	12	15	18	9	10	8	12	13	15	182
La	9	15	13	9		10	9	17	19	9	4	3	13	13	14	157
Li	9	9	10	4	10		9	17	13	8	7	2	12	12	12	134
Log	8	14	16	8	11	11		10	15	10	10	9	10	10	13	155
Lor	6	9	11	5	3	3	10		12	3	4	6	6	6	8	92
Mi	3	7	5	2	1	7	5	8		5	5	4	4	5	2	63
Mo	13	13	16	11	11	12	10	17	15		8	7	11	15	14	173
Na	12	16	11	10	16	13	10	16	15	12		11	15	12	15	184
Ne	16	18	12	12	17	18	11	14	16	13	9		14	13	16	199
Pi	6	9	13	8	7	8	10	14	16	9	5	6		13	11	135
Ta	8	13	10	7	7	8	10	14	15	5	8	7	7		11	130
We	5	15	9	5	6	8	7	12	18	6	5	4	9	9		118

CHART II
Score Sheet—Round Robin Tournament, North Texas State Teachers College—May, 1934, 15 Players—98 Matches.

ice at the end of each game, and changing courts on odd games. The players paid no attention to the scoring of 20 points. The scorer, meanwhile, entered each point on a score sheet as it was won, until the total of 20 points had been played. She then called the match and the players ceased regardless of where they were in the game and set.

It was possible for one opponent to win all 20 points, for them each to win 10 points, or any other combination of the numbers from 0 to 20. Chart II above shows the score sheet used.

Each match took between 10 and 15 minutes. A player occasionally participated in as many as three matches in one period, but the more usual number was two. Therefore, the element of fatigue was negligible. The scorer was a member of the group not playing at the moment. At the end of the Tournament the scores were totaled and the rank order list composed.

The use of the Round Robin technique in obtaining a criterion is based on the hypothesis that if each person in a group plays every other

member of the group, the resulting rank order list is a very fair indication of actual playing ability. It is entirely objective, in contra-distinction to the subjectiveness inherent in even the most "objective" judgment.

The Round Robin technique is, of course, quite a lengthy proceeding. This relatively small group of 15 players involved 98 matches and took about six weeks to complete. It is too cumbersome administratively ever to be of practical value as a test, but it has three unique features which recommend it highly as a criterion. These are:

1. It makes use of the actual game situation. The fact that the two opponents use tennis scoring does two things: first, it does not put more than a normal premium on ability to serve; and second, it has a proper psychological effect, making the players themselves feel that they are really playing a game of tennis. This is so true, in fact, that in no one of the 98 matches did the players know, without asking, how the 20-point score stood.

2. It is about as completely objective as the game itself. A player's score does not depend upon opinion as to her ability.

3. It is a measure of what a person can actually do in the way of tennis skill.

It might have been better to allow 40, 50, or more points but time did not permit the use of more than 20. Players gave as their opinion that, "on the whole, 20 points allowed you to show what you could do." Table III gives the correlation figures.

TABLE III

CORRELATION COEFFICIENTS

NORTH TEXAS

Group A	*Criterion*	*r*
Test	Ranking 1 Expert.....	.84
	Round Robin	.90
Re-test	Ranking 1 Expert.....	.83
	Round Robin	.85

SUMMARY

A. Dispersion

The measures of dispersion, given in Table IV, indicate that a representative group was studied, and that a normal distribution exists in tennis ability as measured by this Test. The most significant feature of these figures is the close similarity between the sigmas. The means also are interestingly close. These facts would seem to indicate that the test

TABLE IV

MEASURES OF DISPERSION

Group	*Mean*	*Sigma*
Whole (T. C. excepted) 723 Cases	21.02	11.73
Eastern Society 534 Cases	18.9	11.15

is sufficiently reliable to produce similar results were the experiments to be repeated.

B. Objectivity

The test is objective because:

1. Opinion as to skill is not involved.
2. Scoring is not dependent upon a judgment of worth.
3. The testing media may be kept constant; i.e., backboard, balls, racquet, time.

It is not objective to the degree that the judgment of the scorer is employed in determining whether or not a ball hits on or above the net line, and to the degree that accuracy in keeping track of Hits and Balls Used and transferring these figures to the score card is involved. These factors, it is believed, are not of sufficient magnitude to render the Test unobjective. The organization, providing as it does for one specific duty per individual over the short period of 30 seconds, tends to make for a high degree of accuracy in the small amount of judgment required.

C. Validity

Table V brings together the correlation data discussed separately on pages 67–70, into a single picture.

The most significant fact brought out in the preceding analysis is the relationship between the validity of the criterion employed and the size of the *r* obtained. In all but three instances the higher *r*'s are based on the more valid criteria, whereas the lower *r*'s are connected with the least acceptable criteria, leading to the definite conclusion that they are spuriously low and not truly indicative of the worth of the Test.

The critical evaluation of the criteria as developed in the section *Statistical Data and Analyses* seems to divide them rather clearly into three groups; *first,* those that are too unreliable to justify the drawing of conclusions; *second,* those that are more sound, but still only good enough to show a tendency; *third,* those that are acceptable and on which definite conclusions may be based.

In the first group belong the Semester Grade and Round Robin criteria as developed by Mt. Holyoke and Eastern Society data. The *r*'s involved in this group are six in number and run from .38 to .70, and from them conclusions may not be drawn.

The second group includes the ranking by one expert as used with the Goucher and North Texas groups. Nine *r*'s were obtained ranging from .61 to .96. Since seven of these are better than .80, the tendency would seem to be strongly in favor of the Test being a valid instrument.

Ranking by three experts as used with the Teachers College group and the second Round Robin technique as perfected at North Texas are the criteria included in the third group. The 3 *r*'s involved range from .85 to .90. Not only are these coefficients the most trustworthy, but they are also satisfactorily high. Therefore, it may be stated that the Back-

board Test is a valid instrument to be used in the classification of groups of individuals on the basis of tennis ability.

D. Reliability

Table VI shows the figures on reliability. The *r*'s obtained in testing for reliability range from .84 to .90. The lowest is from the data of the first experiment when a retest was impossible, and the method of chance

TABLE V

MEASURES OF VALIDITY

Group	*Criterion*	*r*	*P.I.**
T. C.	Ranking		
13 Cases	3 Experts ..	.85	.47
Goucher			
Whole	Ranking		
64 Cases	1 Expert ...	.84	.46
Goucher A	Ranking		
10 Cases	1 Expert ...	.93	.63
Goucher B	Ranking		
11 Cases	1 Expert ...	.96	.72
Goucher C	Ranking		
12 Cases	1 Expert ...	.66	.25
Goucher D	Ranking		
10 Cases	1 Expert ...	.81	.41
Goucher E	Ranking		
10 Cases	1 Expert ...	.95	.69
Goucher F	Ranking		
11 Cases	1 Expert ...	.61	.21
Mt. Holyoke			
Whole	Semester		
30 Cases	Grade	.58	.19
Mt. Holyoke A	Semester		
15 Cases	Grade	.38	.08
	Round Robin	.65	.24
Mt. Holyoke B	Semester		
15 Cases	Grade	.70	.29
	Rating	.60	.20
Eastern Society	Rating		
534 Cases	Instructors ..	.52	.15
N. T. S. T. C.	Round Robin	.90	.56
A	Ranking		
15 Cases	1 Expert ...	.84	.46
N. T. S. T. C.	Round Robin	.85	.47
Retest A	Ranking		
15 Cases	1 Expert ...	.83	.44

* Predictive Indices are included to give the reader a better basis for comparing data. Pearson *r*'s cannot be compared directly, but P.I.'s may be. For example, *r* .85 is not twice as high as *r* .425, but nearly five times as high! But P.I. .47 *is* twice as high as P.I. .235 in indicating true "going-togetherness."

halves employed. Considering the retest groups, the coefficients of reliability range from .87 to .90. Coupled with the fact that the Probable Error in each case is low, ±.05 or less, this represents an acceptably high degree of reliability.

TABLE VI
MEASURES OF RELIABILITY

Test	*Criterion*	*r*	*P.I.*
Trials 1,3	Trials 2,4		
T. C.		.84	.46
N. T. S. T. C.			
Whole	Retest	.90	.56
N. T. S. T. C.			
Group A	Retest	.90	.56
N. T. S. T. C.			
Group B	Retest	.87	.52

CONCLUSIONS

1. The Backboard Tennis Test may be used to measure improvement or achievement by testing a group at the beginning of a period of instruction and practice, and again at the close of the term. It would not be correct, of course, to grade on the basis of increase in Test score alone. We are unable to say up to what point an individual is capable of improving. Also, the known fact that improvement is easier and more rapid at lower levels of ability than at the higher suggests that the beginning player, having more room for increase in skill, is likely to show a larger numerical increase in Test score than will the advanced player.

2. The simplicity of the Backboard Tennis Test, and the fact that it can be administered to a normal size class in one period, also recommend it as a motivating device. When used in this way it may prove a valuable method of stimulating the individual to greater effort. It is interesting to note here that 85 per cent of the North Texas group, after a two weeks interval of instruction and practice, showed substantial increases in scores on retests.

3. The most important use of the Test is as an instrument for the classification of groups whose degree of present ability in tennis is unknown. It is suggested that those scoring below 10 points be classified as Beginners. Those scoring between 11 and 32 might be grouped as Intermediates. Above a score of 32 is suggested as the range for an Advanced classification. No doubt it will be found necessary to exercise judgment in the sectioning of borderline cases, possibly over a 5-point range above and below the indicated points of demarcation.

4. Further experimentation is necessary to establish norms. A study is at present under way with a group of persons who have never played tennis to investigate the lower range possibilities. Similar experiments need to be made with other levels of ability. Contributions of test results and other data by anyone interested in this future experiment would be most welcome.

Part II

Programs for the Conservation of Physical Powers

"It is better for a man to maintain himself in good health than to load himself with learning. Indeed, I would rank good health very high in the major satisfactions of life. I would almost say: "Be healthy and you will be happy." The common phrase, "enjoy good health," is a just phrase. When one has good health one enjoys it all the time, and the healthy man needs little else for his satisfaction."

—Arnold Bennett.

Saga: Redirecting Physical Education in a City High School

By Carl G. Chamberlain

I

In 1926 "physical training" was a well-established subject in New York State. Relief-drills, gymnastics, and a few collegiate major sports made up the program. Most men directors were preoccupied with interschool sports. The major events of each year were regional and state championships in basketball and track and field sports. We were conforming to the mode.

But in 1927 a new program of "physical education" was outlined by state officials. This program derived its justification from two sources—educational philosophy and educational psychology. Philosophy provided aims and objectives—health, social efficiency, and culture. Psychology suggested methods—individual differences and individual adjustment thereto; equality between opposing teams; player-control; the reorganization of classes and regrading of materials; and measurements to determine needs, to equalize teams, to discover those most worthy of freedom and to evaluate results.

Representatives of the State Department visited Rochester to discuss these new programs. We talked with them. We argued. They explained; we listened. It seemed we would rebuild the ship together. We would begin with a power plant of sound philosophy. We would chart a course, stick to it, and reach our destination!

In the beginning we were frankly skeptical and challenged at every opportunity all suggestions made covering the new program. Experiments in our own school brought these tentative conclusions:

1. Claims for the benefits to be derived from a redirected physical education program were in every instance substantiated by our experience.
2. Pupils were more interested in the work.
3. Programs could be arranged to meet individual needs.
4. Results could be measured.

In December, 1927, it was the writer's privilege to present to his superiors a synopsis of a proposed redirected health and physical education program for the Charlotte High School, to begin in January, 1928. This proposed plan covered the following points:

1. It would attempt to meet individual needs by segregating pupils into homogeneous groups for physical education, by means of (1) medical examinations and (2) physical fitness tests.

2. Existing classes would be reorganized to meet the new conditions. This would involve some adjustments in the registration procedure.

3. Additional teacher help would be required.

4. Public opinion must be developed. (This was done through the media of letters to parents; talks before Parent-Teacher Associations; and talks at faculty meetings and student assemblies.)

5. Additional equipment would be needed.

The advantages which we hoped to derive from the proposed program were:

1. Graded work for the individual
2. Results which could be measured
3. "Dosage" of physical education time according to pupil needs
4. More emphasis on intramural activities
5. Less emphasis on interschool activities
6. Development of student leadership
7. Improvement of the status of health and physical education as a part of the school curriculum.

II

With the joint approval of Dr. Herbert S. Weet, Superintendent of Schools; Mr. Roy L. Butterfield, Principal of the Charlotte High School; and Mr. Herman J. Norton, Director of Health Education in the Public Schools of Rochester, New York, the redirected program was inaugurated in January 1928.

Registration and Organization.—The first problem to confront us was the matter of registration procedure. How could we work these new classes into the already crowded school schedule? The solution was relatively simple. Tallies were made for physical education, *the same as for all other subjects*, on a bases of four types of physical education work being offered, viz., (1) work for "handicapped pupils," (2) "low average" classes, (3) "high average" classes, and (4) "physically superior" pupils. The number of classes for each type of work was determined in the usual manner, and the registration completed along with the registration for other subjects in the curriculum. Thus, because the "low average" group consisted of but twenty-six pupils, and so was a "unique" in the program, it was scheduled *first*, along with other uniques such as trigonometry and Virgil. If there were three classes to be assigned for any phase of work, they were assigned as "triplets" along with other triple subjects. In this normal manner the registration was completed, and we were ready actually to start working on the very first day of the new semester.

Special Cases of Handicapped Pupils.—The work with pupils whose P.F.I's were low, or whose medical examinations showed that they were handicapped, was naturally of major interest to us because it was a new problem. These low P.F.I.'s indicated conditions that challenged every resource to determine causes and remedy conditions.

The following cases are illustrative:

a) John—Age fourteen years; Physical Fitness Index 67; father deceased; poor financial conditions at home. Conferences with John disclosed that he had been suffering from earache for the past year. Mother anxious to cooperate and readily consented to examination. School physicians reported rapid heart rate, fatigue posture and poor nutrition. Third physician checked up on cardiac condition and also recommended a visit to the eye, ear, nose, and throat clinic. Conference with mother resulted in John's going to family physician for fourth examination. In the meantime he was put in a nutrition group at school.

Health education teacher reported findings of three previous examinations to the family physician. Family physician influenced the mother to permit John to attend eye, ear, nose, and throat clinic. The clinic diagnosed the case as chronic pharyngitis, and began treatment.

At the close of school in June, the condition had cleared up, and the lad had already gained six pounds. A beautiful case of a low P.F.I. indicating a condition which needed attention, and a fine example of meeting individual needs in health and physical education.

b) Henry—Age fourteen years; Physical Fitness Index 31; markedly obese. Referred to school and family physicians for check up. Diagnosis of congenital deficiency and glandular disturbance. Pupil put under treatment at hospital clinic and at close of school year showed definite improvement in his condition.

Another case of a serious health handicap brought to the attention of the teacher through the use of the physical fitness tests.

c) R.A.—Age fifteen years; Physical Fitness Index 60; Medical Examination disclosed generally run down condition, and marked constipation. Through the systematic development of sound health habits and regular exercise the constipation was improved and the Physical Fitness Index raised to 103, a gain of 43 in one semester!

Recreational and Social Development.—Nor did we ignore or neglect the social development or recreative skills and interests of pupils of low or high physical fitness. Classroom teachers and outsiders were appointed to expand already strong intramural and interschool sports programs. Pupil management was extended wherever possible. So-called player control was instituted in the conduct of interschool contests, and many minor adjustments were made to achieve more effectively the social efficiency and cultural objectives of the State program.

Thus, the critic who might be tempted to question the "redirected program" as one-sided, favoring health aim exclusively or chiefly would be grossly in error. We had not made health objectives paramount—we had only placed them *first* in order for administrative purposes.

Results.—In June, 1928, we were able to report the following results from the redirection of the health and physical education program:

1. Ninety-eight per cent of the boys able to participate at all actually participated in some form of organized, after-school recreation.

2. Among the "physically gifted" pupils the group average P.F.I. increased from 119 in January to 130 in June. Their social efficiency and culture had also improved noticeably; though, unfortunately, we had no measuring instruments to determine "how much."

3. In the "high average" group, the group average P.F.I. increased from 98.4 in January to 104.3 in June, with proportionate improvements in social character.

4. In the "low average" group, the average P.F.I. increased from 89.2 in January to 100 in June.

5. In the "handicapped" class, results were most significant:

a) Twenty-six complete stripped medical examinations were made, including Wasserman reaction and urine analysis.

b) Two cases were hospitalized.

c) Each pupil in the group increased both his Strength Index and his Physical Fitness Index.

d) Thirty-one interviews were held with parents.

e) Two cases of flat feet were remedied.

f) Each pupil participated in at least one leadership project, thus gaining at least some experience in "citizenship."

g) Three pupils had defects remedied during summer vacation.

h) Two pupils, apparently 20 per cent or more overweight, reduced to average weight for height, and five other overweights made progress (of course, their P.F.I.'s increased greatly).

i) Nine apparently underweight pupils attained average weight for height, while four others made perceptible progress (with great increases in P.F.I.).

j) Every pupil in the group learned to wrestle or play handball.

k) Every pupil in the group learned to play tennis and baseball.

l) The group average P.F.I. was increased from 71.5 in January to 87. in June—a gain of 21 per cent*.

6. Pupils throughout the school showed increased interest in the physical education program.

7. Faculty associates were unanimous in expressing approval of, and interest in, the redirected program.

Administrative Opinions.—Dr. Herbert S. Weet, then Superintendent of Schools in Rochester, New York, said:

"If there is one principle more than another by which we can determine whether a public school system is headed in the right direction, it is found in the extent to which that system is using all its possible resources to think and work in terms of the individual needs and personalities of the children concerned."

Roy L. Butterfield, then Principal of the Charlotte High School,† wrote as follows in June 1928:

"— The plan appealed to me at once, so I took occasion to read and to listen to expositions on the subject at zone meetings of the State Teachers' Association in Rochester in November, 1927, and to advise with proponents personally. Then,

* Compare this with the gain reported for a corrective group in Quincy, Massachusetts: page 119.

† Mr. Butterfield has since become Principal of the new Benjamin Franklin Junior-Senior High School, one of the largest in the country. Here the author as Director of Physical Education has carried on with an expanded program.

after giving the tests to a limited number of pupils and applying the knowledge thereby gained to what we already knew about these pupils from other viewpoints, I did not hesitate to join in a request and recommendation that this school's gymnasium program for the present semester for boys be organized according to the recommendations given us. In order to carry out such a plan we quite naturally found that procedures would differ from those previously in effect and so some extra effort was required, but this burden was most willingly assumed.

"Although our facilities are distinctly limited and those we have far from ideal, we have experienced almost no difficulty in administration. From my original stand that the plan is desirable, I have come to believe that it is entirely practical in operation and functions much more effectively than health education programs formerly used have done. I would be very unwilling to abolish it, and look forward, if permitted, to extending it to all our pupils, both boys and girls."

Herman J. Norton, Director of Health and Physical Education in the Rochester Public Schools, and a national figure in the field, comments as follows:

"In the Spring of 1927, Dr. Herbert S. Weet, Superintendent of Schools, authorized heads of departments in the Rochester School System to survey all courses of study then being used with the view of recommending revisions . . . to better meet the present day educational needs of school children.

"As Director of Health and Physical Education in the Rochester schools, I had felt for some time that our courses of study should be so organized and administered that they would meet the physical needs of three types of children: namely, those who were physically superior, average, and inferior.

"In an effort to find out whether any school system had developed a testing program in the field of health and physical education which would roughly classify children into these three groups, or if they knew of any school system which had developed a "physical quotient," I wrote to Dr. Thomas D. Wood of Columbia University; Dr. Thomas Storey, of the College of the City of New York; Dr. Henry C. Morrison, University of Chicago; and Dr. James F. Hoosic, Columbia University, and asked them if they knew of any such tests in the field of health and physical education. The answer in each case was "No."

"In the fall of 1927 the then Director of the Health and Physical Education Division of the State Education Department of Albany, New York, asked me to review a manuscript dealing with a testing and measurement program which he was about to have published. After reading through this manuscript, I was convinced that the State Director had thought through and developed an index of the physical fitness which compared very favorably in its field with the Terman Intelligence Quotient used to classify children in the field of mental education.

"We invited the Director to come to Rochester and discuss his program with some of our health and physical education teachers. One of our teachers, Carl G. Chamberlain, Director of Health and Physical Education at Charlotte High School, indicated a desire to give the program a try-out. Mr. Chamberlain's request was approved and the testing program was initiated in the Charlotte High School during the semester beginning January, 1928.

"The results of this try-out indicated that a real administrative contribution to the work in the field of health and physical education had been made. Through the application of this program we were able to classify children and then build health and physical education courses of study to meet individual health needs . . .

". . . In my judgment, the new 'redirected' program makes it possible for all secondary school health and physical education teachers to classify students . . . and to build programs to meet the individual needs of boys and girls . . . I recom-

mend it as a sound administrative program in the field of health and physical education."

Subsequent Developments.—The outstanding results obtained from this first redirected program led to still further adoption during the school year 1928–29. It was hoped that we would be able to extend the program to include girls as well as boys, but lack of a satisfactorily reliable battery of tests for girls precluded the possibility of immediate inauguration of a girls' program on a par with the boys'.

This lack was a challenge that resulted in almost continuous research for three years, finally resulting in a revision of the battery to make it more applicable to both sexes.§

The boys' program was continued during the next year, and is still in operation, although somewhat changed in form from the original pattern. Interest in the work spread slowly but steadily through the state. Opportunities were many to "spread the gospel," and each opportunity was welcomed as a challenge to make physical education really "education through the physical."

With continued experience, it soon became apparent that "progress checks" were necessary in order to measure results as the work proceeded. From this necessity came the use of posture silhouettes, footprints, and various self-testing devices, all of which act not only as progress checks, but as valuable means of pupil motivation.

Girls' tests and norms were finally made available, and the work was extended to include both sexes with equally gratifying results.

Again quoting Herman J. Norton:

"During the school years 1928–29–30, heads of departments together with principals' and teachers' committees revised all courses of study in the Rochester Public Schools. Mr. Chamberlain's successful experiment with the new testing and measurement program convinced us that we should adopt this program and include it in our revised course of study for secondary schools. Consequently, on May 13, 1929, I secured the approval of the Secondary School Principals' Council for the adoption of this program for our Rochester high schools. Since that date, our secondary school heads of health and physical education departments have gradually introduced the program into their schools, so that it is now established in all high schools."

III

Although this narrative has for its *raison d'être* the mere fact that it is a genesis of a new physical education, written for historical purposes,* the writer ventures to gaze into the crystal of the soothsayer to learn what is foretold.

§ "A Revision of the P.F.I. Battery of Physical Fitness Tests," a report, now in preparation, of arm strength tests which are more reliable and easier to administer than push-up and pull-up tests.

* As far as is known to the writer, the experimental program at Charlotte High School was the first completely redirected physical education program in an entire secondary school.

"There is no way of judging the future except by the past"; and so, just as the physical education of the past was the result of the attitudes of those actively engaged in the profession, the future of physical and health education lies with those who have in their keeping the education of boys and girls through a program of activities predominantly physical. The ship has been rebuilt on modern lines; we have the power needed; we have all of the necessities for successfully navigating the sea.

College directors are now becoming interested, and we are facing a "new era" in physical education. Normal schools and colleges are beginning to think about revamping curricula to include tests and measurements and their application to teaching situations. Public schools throughout the nation are beginning to think in terms of the individual. "Physical trainers" are becoming "physical educators"—a change much more significant than the mere change in nomenclature indicates. A new interest in the individual is being born, nurtured, and groomed, and now we find regularly organized classes for physically handicapped pupils in all school health programs worthy of the name.

Will we sail straight and fast to our destination of Health, Happiness, and Good Citizenship with our precious cargo of boys and girls? The present generation of newly-trained sailors-before-the-mast bids fair to sail a straight and true course! It behooves us old-timers to watch the wheel, lest we be out-maneuvered by these younger, more eager helmsmen.

The Lynbrook Physical Education Program

By James J. Carter

THE PROGRAM

A COMPLETE record of "the evolution of the Lynbrook physical education program" would make a helpful document to those embarking on reorganization, for it would illustrate many problems and suggest solutions which others must discover at great cost to themselves. All we can do here is to outline the present program.

1. **Classifications to Meet Individual Health Needs.**—In the spring of every year, all high school pupils at Lynbrook are given Physical Fitness Index tests and classified for the following fall's activities. Eighth graders are tested in their own buildings, and those in grades nine to twelve in the high school gymnasium. Medical examinations are given previously to P.F.I. tests, and where P.F.I. records show the need, special follow-up medical examinations are made.

Distributions are then made. All pupils with P.F.I.'s below a figure *determined by the average for the entire group and the facilities available,* and all with other special defects, as in posture, weak feet, heart defects, malnutrition, and others selected by the school physician, are then assigned to corrective classes for the following fall. All with P.F.I.'s between 86 and 106 in 1934-35 (the figures are different for each year) are required to elect some intramural or interschool sport three periods weekly. Those with P.F.I.'s above 106 (in 1934–35) are not *required* to participate in any activity. In 1932–33–34 the figures in Table I prevailed:

TABLE I

Classification of Pupils, 1932–35

Years	Total Pupils	A	B	C
1932.....	737	176	284	277
1933.....	754	211	340	203
1934*.....	685	227	300	158**

* Smaller enrollment of students because none were accepted from neighboring school district as had been custom for many years.

** "C" group becomes smaller so that more individual work may be done. "Doctor's certificate cases" are now placed in this group which makes the class enrollment larger; but these are not included in the chart because P.F.I. tests are contra-indicated.

It is a distinctive feature of the Lynbrook program that dividing points for groups A, B, and C are not determined in advance of testing. Rather is the plan to include in group C a certain *number* of pupils. Improved facilities to accommodate more pupils and higher school averages from year to year have resulted in the inclusion, in the C group, in 1935, of all pupils with P.F.I.'s below eighty-six for boys and eighty-two for girls, including one third of the entire student body.[1]

2. **Adaptations of Programs for Low P.F.I. Pupils.**—Obviously, the chief need of low P.F.I. pupils is for guidance in the improvement of physical vitality or the correction of specific defects or both. However, corrective procedures are not exclusively or even chiefly specific exercises. Pupils in any C class are divided into two groups. During any particular day one group engages in corrective activities in the special corrective room or rests in a cot room, while the other group goes to the gymnasium for a varied program of marching, games, and sports. The next day the groups exchange facilities, programs, and instructors.

This plan requires two physical directors but, through pupil leadership *of volunteers from group A or B who receive special academic credit*, the burden on teachers is not great.

The school physician supervises all corrective procedures; and the school nurse cooperates by visiting homes. The cooperation between these three official services is of necessity very close and highly important.

Unlike the general concept of "corrective activities," at Lynbrook "correction" means guidance. Thus, contrary and anti-social pupils are readjusted through personal conferences and the assignment of duties as privileges. Overweight pupils are corrected more by games and cooperation between parents and nurse in rearranging diets than by physical activities in corrective classes.

3. **Scheduling Pupils in Group C.**—The problem of conflicts is easily solved by repeating the corrective class four times each day. Two classes are for boys and two for girls. Since individual programs are prepared during the summer the principal can arrange most schedules satisfactorily. Any remaining conflicts are arranged with pupils or parents. The physical education assignments are made first. The 1934–35 schedule and class roster is reported below. Pupils assigned to class C classes attend daily—four days are devoted to physical activity, the fifth to hygiene instruction.

With increased staff and facilities all students would be scheduled according to their most urgent needs. With limited facilities it seems proper for us to recognize first the individual needs of our low P.F.I. group.

4. **Freshman Programs.**—In order to give freshmen (except class

[1] Some directors prefer to set arbitrary limits and then have as an *ideal* goal the reduction to *nil* of pupils in lowest group. (Ed.)

C pupils, who receive general as well as corrective training in corrective classes) the basic training necessary to participate, manage, captain, and officiate in sports and to acquire fundamental experience and skills, they attend physical education programs three periods weekly, two of which include gymnastics and sports; the third is a social dancing class for both sexes. A carefully planned program of teaching guides physical educators, who are able to crowd into one year's formal instruction sufficient knowledge and experience to insure the success of the intramural and interschool sports programs in the upper years.

FIRST SEMESTER
ROSTER OF "C" CLASSES 1934–35

	Boys				Girls				
Class Time	Fresh.	Soph.	Junior	Senior	Fresh.	Soph.	Junior	Senior	Grand Total
9:10 9:50	7	4	13	3					
9:50 10:30					5	9	6	13	
10:30 11:10	3	4	14	10					
11:10 11:40					7	3	13	7	
2:10 2:50	13	2	5	10					
2:50 3:30					3	12	6	6	
Totals	23	10	32	23	15	24	25	26	178
	Boys' Total 88				Girls' Total 90				

5. **Intermediate or B-group Programs.**—The B or intermediate group pupils elect intramural, interschool, or individual activities, which they attend three days weekly, each pupil arranging his days with a class leader or the director. These pupils may change their elections almost at will. Activities are under the supervision of the director, academic teachers, or pupil leaders. Attendance is taken by pupils.

Intramural or individual activities promoted in 1933–34 with the numbers of participants are listed in Table II.

6. **Freedom for Superior-Fitness Pupils.**—A procedure many directors disapprove but which functions satisfactorily at Lynbrook is the excusing of high P.F.I. pupils in grades ten, eleven, and twelve from any compulsion to participate in physical activity. The theory is that (*a*) these pupils already have high physical fitness; they do not

need the requirement; (b) freeing them will reveal, in subsequent tests, whether they have persisting habits—no other method will do this; (*c*) more lasting habits will be inculcated when pupils choose their own time for, as well as type of, activities; (*d*) often the high P.F.I. pupils need redirection into academic activities; and (*e*) if these pupils need redirection for moral or social development, the need will be revealed better under conditions of freedom than compulsion.

TABLE II

INTRAMURAL ACTIVITIES AND NUMBER OF PARTICIPANTS IN EACH FOR 1933–1934

Classification	Activity	Boys	Girls	Total	Facilities Used
Intramural	Football	65		65	School
Intramural	Basketball	90	96	186	School
Club	Horseback	14	28	42	Outside
Club	Polo	10		10	Outside
Club	Bowling	15	10	25	Outside
Club	Fencing	28	22	50	School
Club	Rifle	32		32	Outside
Intramural	Wrestling	25		25	School
Intramural	Hockey (fld.)		50	50	School
Club	Swimming	15	10	25	Outside
Club	Archery	15	15	30	School
Intramural	Baseball	75	50	125	School
Intramural	Tennis	20	50	70	School
Intramural	Golf	20	10	30	Outside
Intramural	Track	40		40	School
Club	Hiking	5	20	25	Outside
Club	Boxing	10		10	Outside
	17 Activities	479	361	840	

Results bear out all the above assumptions. Pupils in A group usually are the most active in sports; they are usually the most social; where they are not the condition is quickly seen. The P.F.I. of A boys increased from 114 in 1933 to 118 in 1934.

7. Interschool Athletics.—Lynbrook High School maintains interscholastic teams in the sports reported in Table III.

All of these sports teams are coached by teachers in the high school, who are employed to perform these duties as well as others. During 1933–34, their wins and losses were as reported in Table IV, which shows that the intramural and corrective programs did not detract from the success of interschool sports. Girls' teams play in the afternoons. Games are followed by tea or dancing. "Social contacts" are the chief *raison d'être* for these games.

Student managers keep attendance records, care for equipment, and aid in preparing schedules.

WAYS AND MEANS

The program sketched above is not excessively costly, for the cooperation of a goodly variety of agencies is secured. Some of these are listed here further to illustrate the scope of the program.

1. **Mobilization of Facilities.**—Lack of school facilities for physical education is a major handicap in many communities.

a) **Gymnasia.**—During the school day, the gymnasium is largely used by corrective and other special classes. A corrective room was provided by using a basement classroom—remodeling it and adding equipment. Later another adjoining class-

TABLE III
INTERSCHOOL ATHLETIC TEAMS

Sport	Boys	Girls	Total	Facilities Used
Football	50		50	School
Basketball	30	30	60	School
Baseball	25	18 (soft ball)	43	School
Track	35		35	School
Golf*	10		10	Outside
Tennis*	10	10	20	School
Bowling*	8		8	Outside
Wrestling*	10		10	School
Swimming*	12		12	Outside
Hockey—Ice*	10		10	Outside
	200	58	258	

* Minor sport activities in which there were informal and league matches, but no records were kept of matches won or lost.

TABLE IV
WINS AND LOSSES BOYS AND GIRLS
INTERSCHOOL CONTESTS 1933–34

Sport	Sex	Won	Lost	Total
Football	Boys	3	4	7
Basketball	Boys	8	5	13
Basketball	Girls	6	6	12
Baseball	Boys	10	1	11
Baseball	Girls	2	4	6
Track	Boys	6	2	8
		35	22	57

room was commandeered and transformed into a combination restroom and "quiet exercise room" for malnourished and heart cases.

Three elementary schools have gymnasia which are used after school hours for high school intramural activities, while the high school gymnasium is used for varsity practice and games. The corrective room is used after school hours for wrestling and ping-pong. During the most crowded hours, ping-pong tables are set up in corridors.

b) **Playing Fields.**—The local athletic fields which include a football field and three tennis courts were supplemented by securing permission for pupils to use private tennis courts. The use of a local Tom Thumb golf course was donated for afternoon activities. The ice hockey team uses the Brooklyn Ice Palace for games, meeting New York City high school opponents. For swimming and diving, pupils go to Long Beach, about six miles away, transportation usually being provided by the girls' physical director, mothers, and friends. A local bowling alley was secured for the exclusive use of school children during certain hours, guaranteeing proper social conditions. A hiking club was formed—to use "all outdoors."

c) **Other Facilities.**—Between six hundred and seven hundred horses (!) were made available at special prices for riding clubs. These are at a state park five miles from the school, but transportation is provided and a five-mile ride included for seventy-five cents. The school fencing club meets with an adult fencing club. A church shooting range is used by the rifle team without cost to the school. The bicycle club uses highways and beaches for rides and picnics. The state park is used for archery during the early fall and late spring. During the winter, archery is carried on one night weekly in the high school gymnasium.

2. Assistants.—One man and two women serve as full-time assistants for grades and high school. (The total city school enrollment is approximately two thousand four hundred pupils.) An office clerk serves during the school day and after school, assisting with records, correspondence, filing, and the intramural program.

Of part-time assistants the following serve regularly:

1. A German teacher supervises girls' bowling.
2. An English teacher assists with swimming.
3. An art teacher assists with archery.
4. Another English teacher supervises the riding club.
5. A commercial teacher supervises the rifle club.
6. A history teacher supervises boys' bowling.
7. Another history teacher supervises intramural basketball, assists in varsity football, and supervises intramural baseball.
8. A science teacher supervises varsity and intramural track and wrestling.
9. The assistant principal now supervises boys' hockey.

The director supervises all after-school activities in high school rooms.

Teachers usually do not receive extra compensation for these services, which are considered part of regular school duties.

Post-graduate students and even senior students are called upon for considerable assistance—to referee intramural basketball, to handle interscholastic ping-pong (a league which involves nine schools and is conducted without assistance by Lynbrook), to arrange facilities for all intramural and most interschool games, to manage the roller-skating club, etc. A small number of post-graduates is relied upon in the course of a year for these duties. About forty-five seniors also assist.

3. Finances.—No general student body organization collects dues to support any phase of the program.

a) A "class night" is conducted annually, which provides practically all the funds for conducting sports, both intramural and interschool. This came about as follows:

About eight years ago a problem arose which seemed worthy of careful consideration. Two boys (brothers) were very much humiliated by the remarks of other students, because they would not join our Athletic Association. Upon investigation we found that financial circumstances in the home prevented them from doing so. As a result, these boys never participated in any of the school functions, athletic or social, though they had potential powers as athletes. When later two other brothers of the same family came to school, they became two of our most outstanding athletes because at this time the Athletic Association had been abolished. Its place had been taken by our

Class Night

Unlike the festivities of "Class Day" during commencement, this is a period of competition which comes to a climax with the awarding of a perpetual trophy usually on the first Friday in December following the Thanksgiving recess. The date and certain regulations are set by the department of physical education, but otherwise Class Night is handled entirely by student committees appointed by the four senior high school class presidents. A scoring system is worked out and points are awarded in the following events:

1. Poster contest.
2. Dramatic skits (written by students).
3. Decorations of gymnasium corners (allotted each class).
4. Sale of tickets.
5. Sale of refreshments.
6. Basketball games (teams from each class, varsity members excluded).
7. Cheers (original cheers and leaders who have not acted in this capacity before).
8. Costumes (in keeping with the scheme used in decorations).

The students of the following departments of the school are called upon in this plan: home-making—costumes; manual arts—frames for decorations; art—posters and painting of mural designs used in decorations; English and dramatic groups write and stage the dramatic skits; commercial department—sale of tickets and refreshments.

Each year we clear as much on this single event as we would if every student paid one dollar to an Athletic Association. Thus, every student is given the same privileges and opportunities as those formerly offered only to members of an Athletic Association. It is unanimously voted the most popular activity of the year.

b) Gate receipts from interschool contests support interschool athletics. The income and expenses from all activities for 1933–34 were approximately as follows:

Gross Income	$2,006.00
Expenses	1,791.00
Balance	$ 215.00

c) The School Department has not provided any sum since 1932 for sports paraphernalia or equipment for players, but pays all salaries of directors, nurses, physicians, and coaches.

d) Pupils pay reduced fees for all special activities such as bowling and horseback riding.

Out of receipts listed above, all interschool and intramural equipment is purchased.

RESULTS

The Lynbrook program is probably not unique in any particular. Rather would the writer stress its balance in organization to attain all proper objectives of physical education, including social, moral, and cultural as well as physical objectives. In one respect, however, Lynbrook may be outstanding: its achievement of proved results in increasing physical fitness. These and other data on results are reported below:

1. Physical Fitness.—Since 1928, the average P.F.I. of the entire High School has increased steadily. This growth is particularly gratifying because it represents a real gain of the entire student body in "capacity for physical activity."

Following through a single class, as an example, the pupils of the 1933 graduating class increased each year in P.F.I. as follows: Freshman year, + two P.F.I points; Sophomore year — two P.F.I. points; Junior year + three P.F.I. points; Senior year + four P.F.I. points. The significance of these gains is revealed by the fact that in most high schools where programs are not adapted to individual needs, the P.F.I. drops about 2 per cent a year. Thus, the real average difference for all Lynbrook pupils remaining four years is approximately 15 per cent over that in the average high school.

The gains by academic classes for 1933–34 are given in Table V.

TABLE V
P.F.I. Changes During 1933–34, by Academic Classes

Class	Number of Pupils	June 1933	June 1934	P.F.I. Gain	Per Cent Gain
Freshman	142	97.83	101.76	3.93	4.11
Sophomore	174	99.52	101.5	1.98	1.99
Junior	145	94.79	96.33	1.54	1.62
Senior	84	90.46	95.08	4.62	5.17

(The above table represents students, who were tested in the various classes designated, both in 1933 and 1934. Irregular entering or leaving students were left out, so that a more accurate estimate of loss or gain in P.F.I. might be ascertained.)

The changes by P.F.I. groups are also given in Table VI.

2. Specially Tested Group.—Any pupil in group C may, in January, be retested at his or her request and be "graduated" from this group for the remainder of the academic year. Table VII shows what happens.

3. Special Cases.—Case reports often illustrate and reveal more than averages. Therefore, five outstanding problem cases are reviewed briefly below, to indicate what is done in the "adjustment" field as well as in simply improving physical powers.

TABLE VI
P.F.I. Changes During 1933–34
by P.F.I. Groups

Group	Number Girls	Av. P.F.I. 1933	Av. P.F.I. 1934	P.F.I. Change
A	77	119.39	114.35	—5.04%
B	110	94.36	95.8	+1.44%
C	65	68.43	72.72	+4.2 %
Group	**Number Boys**	**Av. P.F.I. 1933**	**Av. P.F.I. 1934**	**P.F.I. Change**
A	61	114.48	118.28	+3.8 %
B	110	98.9	98.75	— .15%
C	61	76.74	82.44	+5.7 %

TABLE VII
Results of Mid-Year Retests

Twenty-four students elected to be retested in January 1934 with the following results.

Case	June 1934	January 1935	Case	June 1934	January 1935
1	79	96	13	82	68
2	79	82	14	82	94
3	42	49	15	84	98
4	93 D.C.	111	16	66	85
5	85	87	17	84	89
6	78	90	18	85	94
7	81	89	19	70	67
8	84	95	20	84	81
9	66	78	21	82	95
10	82	91	22	81	91
11	77	95	23	85	95
12	84	98	24	83	82

Case 4 was in this class because of a Doctor's Certificate. His last test was that recorded 93.

Case 3 (overweight) is that of a girl who scored 39 on her first P.F.I. test. Has lost considerable weight and has moved up 10 points, but only 7 points since last June. Average P.F.I. 1934—79.08. Average P.F.I. 1935—87.5.

1. A boy, P.F.I. 62 displayed many anti-social tendencies in gymnasium classes. Upon investigation we found he was not attending an English class because of his refusal to carry out assignments given in class. While in conference with this young man he told the writer in very strong language that he knew where he could get into college without English. He didn't want to put on a gym suit, because he said he looked funny dressed that way. Our small classes and individual-need objectives permitted us to study this boy and work out a solution. The result is the boy

now puts on his gym suit and enjoys his work and is elated over the fact that he has at times been chosen to lead a squad in group work.

2. A girl whose P.F.I. was 43, weight 204 pounds, age 14 years and 6 months, was 71½ inches tall; to visualize this child one can understand why she developed anti-social attitudes. Avoiding others as much as possible, she would not enter into wholesome play situations without encouragement. Our physical educators were able to give her a great deal of help and guidance in the small classes and she began to get fun out of her work. Her P.F.I. moved to 51 then as a senior to 69. Since leaving school she has taken up tap dancing and has appeared in several church plays doing special numbers. She is now attending New York University, dresses noticeably well, weighs 175 pounds and is really a stunning young lady.

3. An only child, mother drove him to and from school in a car. Boy was very much upset in September, 1934, when he found himself in a low physical fitness group, requiring one period a day for physical education.

	June	June	June	June	
Years	1931	'32	'33	'34	—Jan. 1935
P.F.I.	93	91	89	79	96

His parents were irritated by this condition, presumably because of the boy's feelings. He had just been made a regular backfield man on our football team, and he and one other (tackle) were the only two football players in this group. After a conference he agreed to work with us and, as a result, in January 1935 he scored 96. His parents are very much pleased, now!

4. A boy who was putting on weight rapidly and was lazy. Suddenly he became interested in wrestling.

	June	June	June	June	
Years	1931	'32	'33	'34	—Jan. 1935
P.F.I.	77	75	68	77	95

He was willing to diet now and carry out our suggested schedule. He is now number one man (in his class) on our wrestling team, and has increased his P.F.I., as indicated above, 18 points or 23 per cent.

5. It is easy to see that the weight of this boy is responsible for his P.F.I. dropping.

	June	June	June
Years	1932	'33	'34
P.F.I.	65	56	45
Age	13	14	15
Weight	130	150	170

His present height is only sixty-five and one-quarter inches. Blame must be placed on home. Parents won't control the boy's eating or actions. His parents are not respected by the boy and consequently they can't get him to do things other boys do. It is a clear case of delinquency, but we feel we are now getting his confidence. He is keeping a daily weight chart, and may have something interesting to report in June, 1935. These stubborn cases often become, later, our most satisfying ones!

The lack of valid, highly reliable, and properly normed tests of social efficiency[2] renders impossible any adequate report concerning the social development of Lynbrook boys and girls. Even with such tests, it would be well-nigh impossible to separate the effects of physical edu-

[2] See Chapter VII of *Fundamental Administrative Measures in Physical Education* for a subjective test of social efficiency and cultural appreciation.

cation from those of other activities. Nevertheless, the above cases are samples of what is done at Lynbrook.

4. **Growth in Cultural Appreciations.**—Unfortunately, too, tests are lacking to determine how many and what type and quality of cultural appreciations are given pupils. The activities and numbers of pupils who participated, as listed on page 11, indicate the cultural breadth of the program.

SUMMARY

The "Lynbrook Program" is outstanding, if at all, chiefly in two respects: first, a balance is maintained in programs to achieve *all* educational aims. Physical fitness is cared for because without health pupils are impotent—and the greater are their P.F.I.'s (within limits) the greater are their capacities for study, play, activity, happiness, life. But the learning of skills, strategy, the conduct of games, selection of sports, initiative, etc. are not neglected. So, too, is there a definite attempt to broaden culture by leading pupils to engage in a wide variety of activities and on "higher levels." Nor are anti-social traits of selfishness, etc. taught by over-emphasizing winning in games and sports.

The second feature of the Lynbrook program is the measurement of needs and proving of results wherever objective tests are available to perform this vital service. Lynbrook recognizes and acts on the law that *orderly* (*economical or effective*) *progress toward any remote goal in education depends on measurement.*

Notes on "D" Classes

By B. North Parsons and Harold W. Herkimer

DEFINITIONS AND PURPOSES

IN THE terminology of New York State physical educators, "*D*" pupils are those whose physical fitness is very low. "The lowest fifteen (or 20 or 30) per cent of the school, no matter what the P.F.I. level," "P.F.I.'s below eighty-five," "all pupils needing special guidance to eliminate or reduce physical defects, whether of strength, posture, vital organs, or skills" are various local and specific definitions of "*D*" pupils. The most generally used definition includes as "*D*" pupils *all with P.F.I.'s below eighty-five and all selected by other medical and physical tests as needing special guidance to increase physical strength or to remove growth handicaps.*

These pupils in New York junior and senior high schools are required to attend special "corrective" or "developmental" classes three, four, or five periods weekly, depending on local facilities and instructional services. Of course, the object of this procedure is to select for special care those pupils most in need of attention by physical educators. Segregation or homogeneous grouping makes it possible for teachers to meet more effectively the peculiar needs of these physically deficient pupils.

COMMON OBJECTIONS AND QUESTIONS

Physical educators throughout the nation often make certain objections and ask typical questions concerning this so-called "corrective" program. The most common of these are listed below. This entire paper is evidence that most of the objections are unimportant.

1. *Do "D" pupils dislike to take corrective work?* Our six years' experience is quite otherwise. If preliminary explanations are made to both parents and pupils, the latter are actually enthusiastic supporters of programs which require them to attend classes four or five times weekly, while others with higher P.F.I.'s attend one or two periods weekly.

2. *Does segregation into homogeneous groups of "deficients" embarrass pupils so segregated?* Our experience is that but few pupils entertain such sentiments.* Rather are they happy to be so placed that they may quickly remove their deficiencies. And do the rest of us feel disgraced if disease or accidents send us temporarily to hospitals?

3. *Is not homogeneous grouping an outmoded technique?* Our experience at Niagara Falls would not permit us to abandon our belief in

* See Clark's report for Melrose High School on page 111.

the efficacy of this technique. The most recent studies and analyses in this field indicate plainly that homogeneous grouping in terms of true needs is increasing.†

4. *Do you find it difficult to schedule pupils in your* "D" *groups?* Not if the principal is convinced of the value of such grouping and physical educators are willing to give the added time and effort required.

5. *Do parents cooperate for correction of defects and change of habits of diet and sleep?* Yes, to the best of their ability. It is also possible to arrange for outside help such as clinics, service clubs, etc., for procuring such correction.

6. *Do parents inquire about the strength tests?* A small number did when the tests were first introduced—an occasional one since. This contact offers a valuable opportunity to explain the program to parents.

THE NIAGARA FALLS PROGRAM

The values of medical and physical examinations and of determining the physical fitness ratings appear in the adjustments made and results accomplished after these are done.

The first item in the Niagara Falls program is that of class assignment into homogeneous groups. This is not difficult, as our principals are "sold" on the possibilities of the program. With their cooperation, ways are found to make the necessary assignments. The best way to get the assignment of pupils to *"D"* groups is to make these assignments *before any other part of the students' programs is arranged.* This is done at Niagara Falls.

With the above agreement, the physical educators make out their daily programs of classes. The principal then assigns pupils to *these classes* as he desires them. *This must be done before the individuals appear for assignment.*

To accomplish this, pupils are given P.F.I. tests just before the spring semester ends. Of course, pupils segregated by medical and posture tests are added to those with low P.F.I.'s to form the *"D"* groups. These two items arranged, it is then comparatively easy to take care of the entire student body in a short time when it appears for program making. Each pupil's assignment in physical education given him, either for class *"D"* (four periods weekly at certain stated hours), class *"B"* two periods weekly after school), or class *"A"* (complete freedom or intramural activity), he moves on to the various academic assignments.

Delays and conflicts are almost eliminated by this method. But to make it so, the physical educator must do real work in the preliminary arrangements. After one or two experiences of this nature, the carrying out of the registration is almost a routine proposition.

† See particularly *Provisions for Individual Differences, Marking and Promotion* by Roy O. Billett, Monograph No. 13 of the National Survey of Education, The Office of Education, U. S. Department of the Interior, 1933; and *The Perennial Grouping Problem,* F. R. Rogers, *School Executives' Magazine,* October and November, 1934.

Beginning in 1929, the high school pupils have been classified according to physical fitness, determined by physical fitness tests. The ratings in these tests determine the number of times a pupil is required to report for gymnasium work, varying from one period a week to four.

Once the classes begin to meet the real work begins. As we are concerned in this paper with only the "*D*" group, our remarks will pertain, now, to them only. These groups meet four times weekly, but before any real work is commenced each of these pupils has a thorough physical examination by the school physician. Immediately after this is completed, a conference follows with the physician, physical educator, and pupil present. Sometimes an additional conference with the parents is advisable. From these conferences the program is determined. Cooperative efforts may also be necessary with nurse-teachers, dental hygiene-teachers, dentists, psychiatrists, orthopedists.

Activities in "*D*" classes vary from individualized programs to correct posture defects to group "workouts" to improve the strength of all muscles of practically all pupils. After careful examination by the physician, students are grouped according to postural and large muscle needs. For example, student *X* has been examined by the physician and found with excessive adipose tissue through the abdomen and back accompanied with lordosis. Upon referring to his strength test card it is found that his back lift is low. This boy is placed in a group where special exercises are given to strengthen the abdominal and back muscles and improve the postural defect. Similar groups are made up of boys of low arm strength, leg strength, etc. General exercises for all large muscle groups are given to the class as a unit.

This procedure is followed by the teaching and playing of a seasonal program of games—primarily those with acknowledged carry-over value.

RESULTS

The best evidence of the success of the Niagara Falls corrective program is the steady rise in physical fitness of all pupils as shown in Table I below.

Since 1932 the number of pupils decreased in number, but it will be seen by the curve of distribution for 1934 that there has been a notice-

TABLE I

PHYSICAL FITNESS INDICES OF NIAGARA FALLS PUPILS

Class	June 1929	Feb. 1, 1930	Feb. 1, 1932	Feb. 1, 1934	Feb. 1, 1935
A	70 and above	95 and above	100 and above	100 and above	110 and above
B	55 to 69	70 to 94	84 to 99	86 to 99	89 to 109
C	45 to 54	50 to 69	71 to 83	86 and below	76 to 88
D	44 and below	49 and below	70 and below	———	75 and below

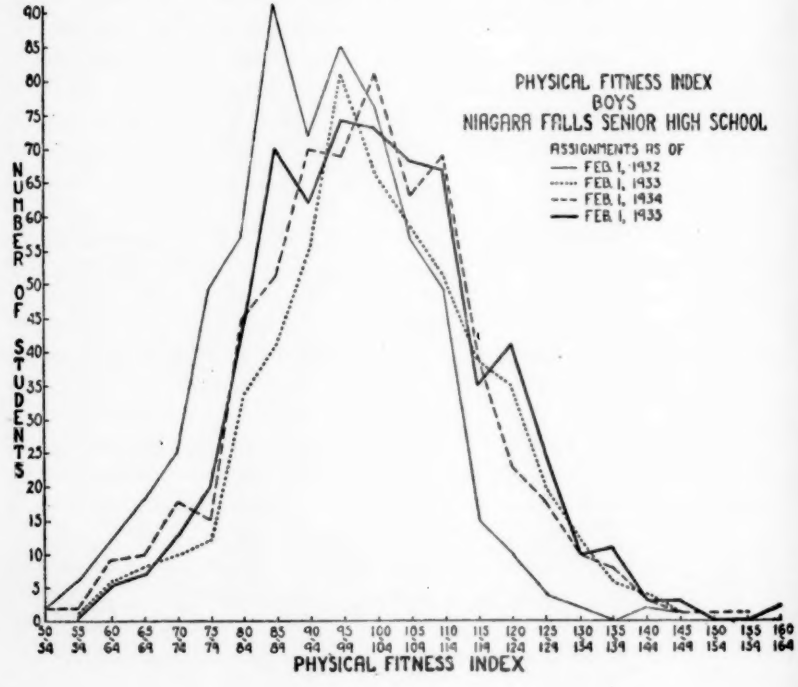
able shifting toward better physical fitness among the pupils. In 1932, the high point centered in the interval of 85-89 while in 1934 the high point has shifted to the interval of 100-104. In 1934 there were more with higher indices and fewer with lower indices than in 1932 as the curves show. This readily shows an improvement in physical fitness among our students from January, 1932, to January, 1935.

From January, 1932, to January, 1935, the median P.F.I.'s for each year were:

Year	*Median P. F. I.*
1932	87.02
1933	98.46
1934	100.74
1935	98.52

These medians and curves tell a highly significant story, for they not only reveal a steadily increasing fitness for Niagara Falls pupils of nearly fifteen per cent in four years; they also demonstrate the wisdom of concentrating on the low or "*D*" pupils. Nor has this policy affected adversely the physical powers of the high P.F.I. pupils, as some critics aver. There has been an upward shift on every P.F.I. level.

The statistician will be struck by two features of the distribution curve—(*a*) the extreme upward shift for 1933, and (*b*) the concentration of P.F.I.'s about the median (or reduction of the σ) for 1935.



The concentration of P.F.I.'s about the median is precisely what P.F.I. theory desires. *Mens sana in corpore sano* suggests the coincident development of both mind and body. Pupils with P.F.I.'s below eighty-five are too weak to carry on efficiently in academic programs: if their physical powers are increased, they will become proportionately more efficient scholastically, while if physical education is neglected, they are likely to lose progressively at least some of the remaining mental power they have. Contrarily, pupils with very high P.F.I.'s are *overdeveloped* physically. To become so, moreover, they must devote to physical activity time and vitality that ought to be given to mental functions. A lessening of physical activity for these is indicated, and therefore a dropping of P.F.I.'s, ***concentrating P.F.I.'s about the median.*** This actual consummation has already been effected at Niagara Falls.

SUGGESTED PROCEDURES

The authors have added here a few suggestions to guide physical educators who wish to introduce *"D"* classes and lack experience.

1. Give medical examinations before any P.F.I. tests are given, and classify as *"D,"* all pupils prohibited by physicians from taking strength tests.

2. Remember that a physician's certificate of unfitness to take regular work is *prima facie* evidence of great need for *"D"* classification. (This policy effects marvelous cures!)

3. The physician should recommend to the physical instructor the type of work each individual needs.

4. In cases of obesity or undernourishment, the physician should advise the student, physical instructor, and parents concerning proper diet and health habits. Advice pertaining to diet should be strictly in charge of the physician.

5. Cases of physical defects should be brought to the attention of the parents and cared for as soon as possible. This is most satisfactorily done by a personal conference with the parents.

6. Conferences of the physician, pupil, and physical instructor should be held at intervals to verify the recommended program and make constructive changes.

7. Physical instructor and pupil conferences should be for the purpose of pointing out the part or parts of the body that need strengthening, the type of muscle activity proposed to bring about that improvement. From time to time repeated tests should be given to show the improvement.

In recording conferences, a sheet similar to the blank illustrated below should be used. An accurate and full record of the conferences, program, etc., is necessary to follow up the pupil intelligently.

PHYSICAL AND HEALTH EDUCATION DIVISION

Class "D"

Health Guidance

Name..... Age.....
Address..... School..... Grade.....
Student referred by.....
Physical Examination by Dr.....
Doctor's Conference-Recommendations .....
.....
Student's Suggested Program .....
.....
Parent and Child Conference with Doctor or Physical Educator—Date.....
Result .....
.....
Results .....

SECURING PUPIL COOPERATION AND INTEREST

1. To reach any desired educational goal it is first necessary to develop interest and cooperation on the part of pupils. In *"D"* classes it will be found much easier to accomplish these administrative and teaching objectives if pupils attend class every day. The close proximity of one day's work to the next has a salutary effect on pupils.

2. Members of *"D"* groups discover through the testing program that they are falling below the standard of physical fitness for normal pupils. Immediately they become "physical conscious." With this consciousness comes a strong desire to improve their physical fitness.

3. It is always a source of great pride to boys particularly to feel that they are in fine physical condition. In fact, boys usually have a tendency toward a "feeling of physical superiority." That is, they usually imagine themselves to be above average, no matter what their true status. Therefore, it is only natural after the testing that *"D"* pupils should be surprised when they find themselves in low physical fitness groups. However, *they are not disheartened but realize that they must take steps to reach the level of their fellow pupils.* This desire to improve adds a great stimulus to interest in proper and systematic exercise. Therefore they enter into the program wholeheartedly. Physical educators ought to encourage the pride of pupils in good physique, but of course within proper limits.

4. This group manifests the greatest interest in its program. *"D"* pupils are anxious to have the gymnasium opened early in order that they may prepare for their daily work as early as possible. Their desires should be met by full cooperation on the part of teachers and principals.

5. The benefits of the entire program are manifold. Students, particularly those in the lower groups, have greatly increased interest in physical education. They like to watch their improvement—the actual benefit as shown by the figures of the tests can be seen and appreciated.

This is the real motivation which this program provides. Therefore, opportunities for retests should be given at frequent intervals.

6. Pupils realize that their improvement is due to better health habits or to the removal of some defect or to both. Teachers should aid slow pupils to join cause and effect.

7. Interest is also developed through the realization by weaker, timid, or athletically inexperienced students that they are in a class with those of more nearly their own ability instead of being in a class with those of greater ability who monopolize the time and activities of teachers. These advantages should be made clear to pupils at the beginning of each term.

COMMENTS BY TEACHERS AND PUPILS

1. "The testing program in physical education is superior to any program used in our high school." (A teacher.)

2. "To require every student to take two gymnasium periods and only two a week is comparable to a physician prescribing the same method of treatment for all his patients." (A teacher.)

3. "Only through tests can students be homogeneously grouped and a progressive and beneficial program carried on." (A teacher.)

4. "Excuses from gymnasium are seldom requested by this group." (A teacher.)

5. *Student Reactions:*

Are four gymnasium periods better than two?

"From my own experience I would say that four gymnasium periods a week are more beneficial to the individual than any number under four. For one year I was classified in the *"D"* group and took four gymnasium periods a week because my strength index was far below normal. Without a doubt I know that those periods were the best I have ever taken. I enjoyed those periods more than any I was ever in before or since. I benefited a great deal physically which is indicated in my increased Strength Index. When I look back on those gymnasium periods, I recall many pleasant memories." (A pupil.)

"Although I was skeptical at the outset of my high school years as to the benefits of four gymnasium periods a week for myself, I am glad to say any doubt I entertained was soon dispelled. I watched myself develop remarkably during the time I was in the *"D"* group. I can attribute it to the regular systematic physical training I received while in the class." (A pupil.)

Meeting the Individual Physical Needs of Girls in Junior and Senior High Schools

By Helen M. Chesky

INTRODUCTION

TO THE writer, junior high school girls are the most interesting and satisfying individuals with whom to work for health improvement, or indeed for the raising of any physical abilities. They are almost invariably intensely pleased to discover that many little (or big) physical defects may be removed by proper exercise, rest, modification of diet, or some other change in behavior which costs nothing more than mental and physical effort. They throw themselves wholeheartedly into these corrective projects and cooperate splendidly.

And this is fortunate for physical educators especially, for several reasons, among which the following are impressive:

First, the prime duty of physical education is to conserve girls' physical powers and to make them more healthy, more graceful, more attractive.

Second, girls vary in physical powers quite as widely as they do in mental powers. The literature of mental education is already crowded with reports of successful experiments in the individualization of instruction to meet the varying needs of each pupil; the literature of physical education ought to be just as great. If it is necessary to treat individual mental needs differently, it is at least as necessary to treat individual bodies differently.

Third, girls tend to *acquire* defects as they grow older. This is obviously true of dental defects; it is quite as true of posture, flat feet, the power of muscles, the nutritional status of the body. Many of these defects are insignificant before pubescence. Many, even if present, cannot be treated effectively before this stage of development is reached. Many begin to appear with the onset of this metamorphosis. "A stitch in time saves nine," applies as well to a girl's physical attractiveness as to her social charm.

Fourth, it is unfortunately true that every advance of civilization brings with it a new threat or positive handicap to normal growth—which must be checkmated by some artificial civilized adjustment or health will decline. The physical educator is best fitted by training, experience, and duty to meet these ever-increasing challenges to health, which affect girls perhaps more than boys.

For these, and many other reasons, the writer welcomed the opportunity presented by her city Supervisor of Physical Education* to modify her junior high school program to meet her girls' individual health problems. The work was begun at the Oneida Intermediate School and was later continued in the Nott Terrace Senior High School, Schenectady, New York. Several reports of this work have been made to local and district physical education associations. This report summarizes the procedures followed by the writer, without statistical treatment of any data. Its purpose is chiefly to give readers some insight into the possibilities of meeting girls' individual needs in typical schools.

PROCEDURES

1. The Oneida school is a typical building, constructed in 1927, with one gymnasium for both boys and girls. Crowded conditions are the rule. Apparatus is meager and lacks variety. Nevertheless, the crowded facilities were not permitted to handicap the program. The writer's interest in this program is the outgrowth of contact with over four hundred girls in this school.

2. P.F.I. tests were given by trained teachers with pupils recording and assisting. Tests were given in two parts—lung capacity, grips, push-ups and pull-ups one day, back and leg lifts the next. The procedure of giving all tests on the same day seemed too fatiguing to these girls, ranging from ten to sixteen years of age. Of course, those suffering from heart, appendicitis, or temporary illnesses of any nature were excused from tests until they had recovered.

3. The testing program revealed that a large percentage each year were, for one reason or another, extremely low in P.F.I., while a good percentage were quite high. The actual percentages varied from year to year with an average of about 30 per cent below ninety P.F.I. points for each year.

4. Crowded conditions prevented the principal from classifying pupils according to P.F.I. and sending them to segregated groups. Therefore, the instructor attempted to segregate the low P.F.I.'s on the gymnasium floor. The usual squad method works well. Divide your girls into squads in terms of their P.F.I. levels rather than by height or age or grade or other less significant measures.† The Oneida plan, however, was to further subdivide pupils in terms of their scores on the various tests; for example, placing together those whose arms were weak, etc.

5. The first step in class work was to explain the meanings of P.F.I. tests and scores to all girls. The I.Q. parallel was used because of girls' familiarity with its use in academic classes. However, instructors stressed

* Everett T. Grout. The program has since been carried forward by Assistant Superintendent of Schools, John H. Burke, M.D., in charge of health education.

† This procedure has the added merit of dividing girls in terms of general ability, as is demonstrated in Wellman's report on *"The Validity of Various Tests as Measures of Motor Ability."* See page 19. (Ed.)

the difference between the two: whereas the I.Q. remains the same, the P.F.I. may be doubled in a few months, thereby doubling a girl's capacity to "do things," study, exercise, work, and, therefore, to enjoy herself. It was emphasized that girls whose P.F.I.'s were low should not be discouraged. But it was also pointed out that their cooperation and the unceasing work of the instructor were necessary, *first*, to discover just why the P.F.I. was low, and *second*, to remove whatever deficiencies existed.

6. Succeeding steps in classes were along the lines of modifying a part of each period to meet the individual needs of all girls. Those needing more active programs were put in heavy gymnastics; those needing posture corrections were treated for these defects. In general, the program consisted of graduated activities on ropes, poles, rings, buck, hanging, and traveling exercises on the horizontal ladder—as well as games and dancing.

7. Pupils who remained obviously weak were made the subjects of special investigations or examinations by the school nurse and physician. If their reports were that home conditions, food, and organic functions were normal, then the exercise program was continued. If special defects or bad habits apparently interfered with growth in P.F.I., of course these became the subjects of special study, and efforts were made to remove them.

8. The physical directors kept in close touch with home conditions and knew each pupil's habits and attitudes towards work, study, and playmates. This knowledge was of inestimable benefit in determining and guiding individual programs.

9. At the end of the year a chart was made of P.F.I. records in September and May, and changes in each test score were calculated and added to the chart. This chart then became the guide to later modification of each girl's program. An excerpt from this chart is shown as Table I.

RESULTS

1. The chief handicaps to the improvement of girls' P.F.I.'s as they appeared in this school were:

a) Laziness, due to rapid growth or bad habits at home and in school.

b) Overweight, which induced laziness or genuine fatigue and, therefore, curtailment of exercise.

c) Glandular malfunction, which prevented instructors from assigning exercise.

d) Indifference, brought about by home environment creating the belief that all forms of work are drudgery rather than pleasure.

e) Low intelligence, which prevented some girls from comprehending the value of good physical condition.

f) Illness, which curtailed activity, sapped vitality, and otherwise

TABLE I

SEPTEMBER AND MAY P.F.I. RESULTS FOR GIRLS IN THE ONEIDA SCHOOL

	Age	Wgt.	Hgt.	Pull up	Push up	Arm str.	Lift leg	Lift back	Grip lt.	Grip rt.	Lung cap.	Str. Ind.	PFI.
Irene K.	14-6	104	67	1	6	119	220	260	60	60	170	989	92
	15-1	110	67	0	6	108	170	210	70	70	170	798	74
		+6		−1		−11	−50	−50	+10	+10		−191	−18
Helen M.	13-11	95	59	1	5	54	210	150	50	50	120	634	74
	14-6	95	60	1	8	90	390	170	50	50	130	880	101
			+1		+3	+36	+180	+20			+10	+246	+27
Beatrice H.	13-4	93	60	8	1	81	300	190	45	40	128	784	98
	13-9	105	63	5	0	70	210	150	60	50	140	680	71
		+12	+3	−3	−1	−11	−90	−40	+15	+10	+12	−104	−27
Marjorie J.	13-2	163	62	4	1	90	420	270	60	90	172	1102	67
	13-7	182	62	4	0	80	370	265	60	80	164	1019	56
		+19			−1	−10	−50	−5		−10	−8	−83	−11
Marian W.	12-2	130	62	0	0	0	250	170	50	60	130	660	59
	12-9	133	63	0	4	64	360	180	60	60	158	882	72
		+3	+1		+4	+64	+110	+10	+10		+28	+222	+13
Mary S.	14-1	141	62	1	0	16	200	190	55	65	136	662	71
	14-8	152	64	0	0	0	310	190	55	65	128	748	46
		+11	+2	−1		−16	+110				−8	+86	−25
Virginia J.	11-5	125	63	1	0	16	250	160	50	50	136	662	66
	12-3	139	65	8	0	152	270	190	50	50	156	868	74
		+14	+2	+7		+136	+20	+30			+20	+206	+8
Minnie S.	13-3	110	62	15	3	234	315	210	65	55	172	1051	108
	13-8	118	62	12	4	208	260	160	85	85	158	956	86
		+8		−3	+1	−26	−55	−50	+20	+30	−14	−95	−22
Rose D.	13-4	143	64	0	1	18	325	200	65	70	190	868	68
	13-11	159	64	0	3	60	410	250	75	70	210	1075	63
		+16			+2	+42	+85	+50	+10		+20	+207	−5

both reduced amount of exercise and restricted the capacity of the body to respond.

2. In spite of these handicaps, much was accomplished. The physically handicapped were reached *as individuals*, their defects were often removed, and their health improved greatly as indicated by P.F.I. test results, as well as by other less objective measures.

3. As the girls low in P.F.I. pass on to senior high school, other follow-up programs effect even greater changes. Their P.F.I.'s increase; overweight pupils discover the benefits and joys of eliminating surplus fat and modify their diets more effectively (the strongest appeal is usually, and not improperly, the desire for personal attractiveness). Pupils with high I.Q.'s but low P.F.I.'s discover that being balanced both mentally and physically is an asset to college and later life. Unfortunately the indifferent girls seldom continue through high school. Consequently their fitness tends to drop steadily.

4. What happens to girls with high P.F.I.'s? ***They tend to remain high.*** Very few lost many P.F.I. points during junior high school years in the Oneida school program. Occasionally illnesses force P.F.I.'s down. Sometimes the best athletes drop because of changed study programs, or affairs of the heart, etc.; but all in all, the chances are that high P.F.I.'s remain high.

5. What is the relation between over-and under-weight and P.F.I.? There seems to be little relation—probably no more than there is between height-weight ratings and true nutritional status.§ Many girls apparently underweight had high P.F.I.'s. Their physical condition seemed excellent. A few apparently overweight girls also had high P.F.I.'s, while many of normal weight for age and height had low P.F.I.'s.

6. Girls, as well as boys, are interested in the P.F.I. tests, if the latter are properly used and if girls are properly instructed in their meaning. In practice, girls would spur each other on to better performances. They were interested in checking their own records against former scores. If they failed to surpass previous marks, the usual request was "May I try again? I know I can do better," etc.

7. As examples of individual analyses and results, the following case reports are summarized below. (These are the individuals listed in Table I.)

Irene K . . . was an excellent scholastic student. She was not robust looking, but was organically sound. Her height was 67 inches and her weight 110 pounds. She was in the period of accelerated growth. Acquiring this height rapidly, she was becoming stoop-shouldered, so typical of the type. In every test given she lost with the exception of a little gain in the grip tests. What she needed was rest from all physical activity. Her body needed strength for her rapid growth. Because of her physical condition she was not very enthusiastic about sports either

§ In this connection see Raymond Franzen, *Physical Measures of Growth and Nutrition*, Chapter II, and the following pages in this Supplement.

as a participant or an onlooker. Perhaps in her high school or college career her physical condition would warrant participation in some sport.

Helen M . . . was another excellent scholastic student. Her first tests were low. She was an honor student, devoting more time to studies and music than recreation until she almost had a nervous breakdown. Her family physician suggested to the family that she ease up on studies and other activities and participate in outdoor activities. She came out for sports and in one term did splendidly and gained a few points towards raising her P.F.I. But, of course, when it came time for graduation she dropped all athletic activities, and when we retested her for the third time she dropped lower than the first time she was tested. The summer after graduation she was recovering from a nervous breakdown.

Beatrice H . . . was a slow student, not especially interested in athletics. She always complained of being tired and wanted to be excused from all types of gymnasium work. A thorough checking with the doctor showed a cardiac condition following an early case of scarlet fever. It was not a wonder that she kept dropping a few points in all tests. If pupils drop too much in each test, it is not wise to encourage them to make greater efforts until a further medical check-up can be made.

Marjorie J . . . decreased in everything. The cause for this was her tremendous weight of 182 pounds. We sent her to the hospital for metabolism tests. She was placed under a doctor's care. Marjorie was very much interested in herself. She tried to participate in all events, but her weight was a handicap. (I might note that I saw her two years later and she had lost forty pounds, having become an expert swimmer and having won places in many amateur meets.)

Marian W . . . was very low in the first test. She gained some in the second tests. She complained of tiredness, and I knew she was not lazy. I was very much interested in this girl and had a conference with her mother. Because Marian thought that she was gaining, she left out certain foods which she needed for growth. As a result, she was becoming tired because of anemia developing. Her mother checked on her diet, and in school we encouraged some rest and asked her to participate in some light activities. We also got her interested in taking a course in home economics so that she would learn food facts and what foods did to the body. When she was retested she gained in everything but pull-ups.

Mary S . . . was low in both tests. Her trouble was a loose knee-cap that slipped occasionally; consequently she was afraid to participate in activities. She had an operation, was excused from gymnasum work for a term, and then reentered classes and participated in some sports. In the third test she gained a few points in all tests and was very much pleased. At the time she was excused for one term, she attended all classes and watched the work and learned rules of various games. In her eagerness not to be left out of things, she acted as scorekeeper or timekeeper. She was very anxious to overcome her handicapped condition and she succeeded.

Virginia J . . . was a good scholastic student, who tried very hard to participate in all games. She lacked coordination, but never gave up hope. In spite of gaining fourteen pounds, she increased in every test except that she made no showing in push-ups in either test. She was a well-balanced student, and in spite of her lack of coordination, entered all events with a great deal of interest. Virginia may never raise her P.F.I. because of her low arm strength, but her enthusiasm will carry her a great way.

Minnie S . . . was an excellent athlete. Her first test was fairly good. In the second test she dropped from group *B* to *C*. We discovered from the nurse's records that she had bad tonsils and was subject to many colds. With the approval of her parents she had her tonsils removed. After that she gradually started on the upward grade again.

Rose D . . . dropped a few points in her Strength Index in spite of a great gain in all tests. Her weight increased sixteen pounds, which made her normal strength index higher. I did not worry about her because her enthusiasm in her work did not lag. What difference did a few points make as long as she was well, physically strong, and participated in all desirable activities? Her parents did not want her to diet to lose weight. As long as she was active, they said, she would eventually attain her normal weight.

THE NOTT TERRACE HIGH SCHOOL PROGRAM

In the Nott Terrace Senior High School, we have for the past 4 years carried on a different program. We give P.F.I. tests to every girl who is registered for physical education (about 950 girls), asking as usual about appendicitis attacks, hernia, etc. With our test records to work on and a few months' leeway before the next tests, we are securing as many follow-up medical examination records of low P.F.I. girls as possible. We are also examining, as far as time permits, the posture of all girls in the *D* group (with P.F.I.'s below 85), the posture of the girls in *C*, *B*, and *A* groups being tested later. Posture defects appear in every P.F.I. group. Many amazing discoveries were made. At the present time we are exploring further the low P.F.I. girls and the results of the posture examinations for 1935. A few characteristic case studies are given below.

Rose F . . . . Rose's P.F.I. rating for three years at junior high school was *B-B-C*. The reason for the drop to the *C* group was a decided drop in back and leg lift; the grip tests dropped also. In high school a decided decrease in back and leg lift was noticed. At all times lung capacity was low. Weight was average for height and age. Further investigation revealed that Rose had flat feet and kypholordosis with all its accompanying stigmata. Her spine lacked flexibility, and she was limited in certain leg and joint movements; e.g. she could not sit tailor-fashion. Her knees were customarily near her chest, and she just could not stretch so that she could sit erect with the knees down. (Perhaps the Y-ligament had something to do with it?) This girl is now in a corrective class, very much interested in her condition and doing everything to overcome this handicap of poor posture. If we cannot adjust her posture, we will at least strengthen and lengthen her muscles and further stretch the ones that tend to shorten, and will improve her flat chest, endeavoring to improve the muscle tone to give her a better chest expansion, when her lung capacity will be increased. She takes foot exercises to tone up her muscles and then special exercises to tone up her back. She had been photographed, and at the end of the term she was photographed again and she herself was able to see that she had improved. Self-correction in front of a mirror has performed miracles for her. Her mental attitude is such that she sees improvement every time she looks at herself. If only more had that attitude, wonders could be accomplished. Her P.F.I. has lately increased.

Anna C . . . was in class *C* for three years during her junior high school work. She was in class *C* for two years in senior high school. She has remarkable arm strength because she works hard at home, but her back lift and lung capacity are very low. This results in a fatigue posture. She is also flat in the lumbar region. Flat feet accompany all these conditions. She has been photographed. She is now in a corrective class. We are interested in improving her posture and in having her P.F.I. increase steadily.

Jean C . . . is a problem case. She was in P.F.I. class *B* in junior high school

work. In senior high school she increased her fitness to group *A*, then *B*. On examination, after noticing her decidedly high shoulder in street clothes, we discovered that she had a transitional curve. We are particularly interested in Schenectady in determining why some of these bad postural cases remain in a high P.F.I. group.

Martha B . . . is another unsolved problem. She rated group *A* for three years in junior high school and in group *B* two years in senior high school. She is underweight and has a most decided left total curve. Evidently her general physical fitness is high and the postural defect is not great enough to affect her fitness seriously.

Emily C . . . had three *D*'s in junior high work. In senior high school she has two *C*'s. She has a poor posture due to rapid growth and under-nourishment. We are trying to strengthen her body by exercises. She is under the nurse's supervision, drinking milk in school. Her continued low P.F.I. in spite of corrective procedures indicated a failure somewhere—at home, in diet, or in organic defects as yet undiscovered, or the need of a different physical educational program. (Possibly increase in rest and sleep two or three hours daily will help.)

RECOMMENDATIONS

The writer has added the following suggestions for those directors of girls' physical education who as yet still lack confidence in the value of individual work for girls, or in the utility of physical fitness tests for girls.

1. The most interesting and encouraging way to check one's work is to plan a chart of some description with one's own method of reporting gain or loss. The writer has used the method illustrated on page 105 in intermediate grades. We now have large cards which carry cumulative P.F.I. test records through intermediate school and high school. It is very gratifying to compile and study these records, for they usually show steady improvement in pupils. (The cases reported in this paper were selected as unusual problems.) Besides, it is only by means of some sort of a chart that one may check progress.

2. We found that in senior high school girls are more interested in "improving their posture" and in "keeping good health," whereas junior high school girls are interested in the P.F.I. itself. Of couse, the fact is that one does not greatly improve posture or health without its being reflected in P.F.I. increases. So by appealing to girls' feminine instincts for better health, improved posture, and a slim figure, we accomplish more than by reference to a mathematical calculation.

3. Physical fitness for girls is improved too by talks on personal hygiene, by discussions on the relation of diet to health, by giving reasons why good posture is essential for maintenance of health and appearance, by explaining to girls why exercise is necessary for a firm, muscular body. If girls do not wish to participate in extra-curricular school activities, we urge them to join outside organizations where they can enjoy and learn various forms of exercise. Swimming, horse-back riding, and hiking seem to be the most appealing activities.

4. We are always striving for a well-rounded program for girls and

ever striving to have them become "health- and posture-conscious"; we encourage them to participate in healthful sports, and bring out the fact that well-balanced living brings color to the cheeks, sparkle to the eyes, and a live, energetic body.

5. Try these methods and then retest your girls. You will be pleased to see their arm strength go up, their backs and legs grow stronger, their lung capacity increase, their total fitness improve. If you approach students in this manner, parents will cooperate actively and enthusiastically. How much better is such a program than a cut and dried formal lesson. The high school student must see and be shown what is happening. When she is convinced what it is all about, then all is smooth sailing.

6. If you can show the school administration that you are accomplishing something for the betterment of the pupils, you will receive their heartiest cooperation. Do not be satisfied with your work and stop. New ideas and plans to improve your work should be your aim.

7. Different methods of approach are helpful, too. Consult your school physicians and nurses. Perhaps together you will be able to hit upon some plan that may work splendidly to enlist girls' interests and active cooperation.

8. The cooperation of orthopedic physicians is of great help to physical directors, for through them you can improve your knowledge of muscles and their special functions. If you have had special training in orthopedic work, concentrate on corrective classes for your *D* group and others who may need the work.

9. Lack of facilities is no unsurmountable handicap to the purposeful director. Some have no gymnasiums; some have large classes and small gymnasiums. Equipment for either class work or corrective work is not absolutely essential. Devise your own apparatus. Find a space in a corner for your corrective classes. Play games in the halls, outdoors, or any available space. Use your judgment for seasonal activities.

10. Do not fear that strength tests will strain or otherwise harm your girls. In tens of thousands of tests at Schenectady during the past seven years not one girl has been really harmed. Of course many are stiff for a day or two after being tested if they are not in good condition. The anatomy of girls is really better adjusted to the strains of lifting weights than is that of boys.

Melrose High School Experiments

By Leonard Clark

THE WRITER offers these data and observations as examples of what may be done during a first semester's experiences with objective measurements in a modern high school.

Our Facilities.—Melrose High School is a thoroughly modern building, completed in 1934, to accommodate fifteen hundred pupils. There are separate gymnasiums for boys and girls, with proper directors' offices and attached "exercise rooms" which make excellent small gymnasia for corrective classes. Outdoor facilities are good too.

Our Staff.—The writer is alone in charge of all gymnasium activities for over six hundred boys. In addition he conducts intramural sports and is coach of the varsity basketball and track teams.

Our Class Schedule.—All boys attend gymnasium classes two days weekly. Last fall we arranged with our stimulating and cooperative principal, Mr. William D. Sprague, to require boys needing extra work to attend a third period, which is taken from their *"S"* or study hall classes. Classes run throughout the day, the writer conducting five different classes each day. Class periods are fifty-eight minutes long.

Our Program.—Last fall we tested all boys for the first time, using P.F.I. tests. Since it was impossible then to segregate the low P.F.I. boys we did the next best thing: placed them in the corrective room while others in their groups were exercising in the main gymnasium.

Our activity program for the general group ranges from sports to formal drills. Corrective activities are individually assigned. The school physician advises on these. Boys are also stimulated to do "home work in physical activity," or to modify diets, etc.

Handling Classes.—The writer, as reported already, meets all classes. During each period he shuttles between the corrective room and the main gymnasium. Of course, pupil leaders are extensively used. In the corrective room boys help each other and are critical in reporting to the director how others perform their exercises. In this work particularly, we expect boys to emerge heated to the perspiring stage. The work is arduous but stimulating.

STATISTICAL RESULTS

Corrective Classes.—One hundred and two boys were in corrective classes for 6 weeks between tests given in November and January. Of these, 92 were retested. Eighty-four gained in P.F.I., 6 lost, 2 remained the same. The median P.F.I. on the first test was 82.9. It rose to 95.7 on the second test— a gain of 15 per cent in six weeks. Of those

who gained, the average increase was 15.4 P.F.I. points. Of those who lost, the average decrease was only 3.8 points.

All boys with P.F.I.'s below ninety were included in the group. Of these only sixteen failed to reach ninety in the second test. Median scores in each test are reported in Table I.

TABLE I

Test	First Score	End of 6 wks.	Per Cent Gain
Lung Capacity	238 cu. in.	250 cu. in.	5
Right Grip	82.6 lbs.	95.7 lbs.	15
Left Grip	72.5 lbs.	90 lbs.	24
Back Lift	311.9 lbs.	367.3 lbs.	17
Leg Lift	481.5 lbs.	561.1 lbs.	16
Push-Ups	1.7 times	5 times	194
Pull-Ups	1.3 times	5.5 times	323

Entire School.—Tests were given to all students in the school in June, 1934, and February, 1935. The results are reported in Table II.

It is interesting to discover from the tests in what good condition these boys are. The writer has reviewed reports from other schools in New England and elsewhere. Therefore he would not be surprised to learn that some directors might question his data, since the average high school boy in New England seems to have a P.F.I. of about 110. Further west the median seems to be lower, perhaps about 100.

TABLE II

Date of Test	No. of Pupils	Median P.F.I.
June, 1934	616	111
February, 1935	618	124

Two questions present themselves. First, are the Melrose boys actually so high? And if so, why?

Let me report some convincing facts:

1. Initial tests were given by trained testers from Boston University, using instruments which had been properly calibrated at the Massachusetts Institute of Technology.

2. We found 11 boys whose S.I.'s were over 3000 points in February. Their median age was 17.6, weight 164 pounds, Strength Index 3138, P.F.I. 139.

3. Many of our boys chinned themselves more than twenty times.

4. One boy pushed-up 40 times *and five minutes later* chinned himself 30 times. His S. I. was 4288, and his P.F.I. was 202.

5. Leg lifts of over 1000 pounds were common—*using standard in-*

struments and techniques. One 96-pound boy, fifteen years old, lifted 800 pounds in June and 795 pounds in February. (His father had once had a weight-lifting record at Harvard.)

Why are Melrose boys so fit?

1. The community is one of the most highly favored in the Greater Boston area. It is a small city of homes, set in the hills on the "North Shore," northeast of Boston. Parks and playgrounds abound. Swimming facilities are everywhere. There is no poverty. Community spirit is excellent. Schools are modern.

2. The new program was energetically directed towards physical improvement, and pupils responded eagerly. This was particularly noticeable after the director had announced that a second test would be given "in three weeks." The boys immediately wanted to have the instruments to test themselves, but were refused, of course. They wanted to know their old scores. These were given to them. They studied the method of calculating indices. Parents began asking for scores. Newspapers carried stories on testing.

3. The corrective class pupils were extraordinarily responsive. Many of these boys did work at home.

4. Great interest was aroused by an expedient used to increase the grip strength of a boy who had broken his arm and one of whose hands was consequently weak. The director bought him a rubber ball to squeeze "when he had nothing else to do." Soon other boys were squeezing balls until at last there were forty or so in pockets and bouncing on floors (to the annoyance of academic teachers sometimes we fear)!

5. The principal, and even the superintendent of schools, lent their active encouragement and material assistance. Other teachers became interested and athletic coaches cooperated. What else could happen but health improvement!

OTHER NOTES

Corrective Classes.—Many boys wish to remain in classes during the spring semester. (This group will include all boys with P.F.I.'s below 100.) For example, a post-graduate had begged the principal to excuse him from physical education. He was refused—and also by the superintendent of schools and the school physician. His P.F.I. was 81.

He was put in the corrective group—did not like it—improved a few points in November tests—became interested—worked—now P.F.I. over 100—wants extra periods of corrective work—has a "new lease on life."

Equalizing Teams.—Six touch football teams were organized on an equalized Strength Index basis. Each team played five games. All games ended either in tie scores or with the winners one touchdown ahead.

Casual Observations of Grip Tests.—It has often been said that

business and professional men have stronger grips than laborers. To check this the writer tested eight laborers working near the school. Their average grip strength was 111 pounds. Eight men teachers in the Melrose School had an average of 140 pounds.

The responsiveness of grip strength to minor illnesses was checked. Boys with colds dropped noticeably. One individual ill in bed with influenza dropped 50 per cent in grip strength. Five days later, the fever gone, he had regained practically all his lost gripping power.

The S.I. as a Qualification for Football.—The football coach, after observing testing in June, was so impressed with its significance that he announced the following rule: No boy with an S.I. below 1800 is eligible for varsity football.

This brought some boys to the gymnasium for special exercises and consequent improvement in playing powers. (The average S.I. of the first eleven men in 1934 was 2486.)

Just before the close of the football season the November tests showed that two football players were declining in P.F.I. This was brought to the attention of the coach with the suggestion that these players were probably "stale." The coach replied, "That explains it! I have been driving these boys lately, thinking they were loafing."

The boys were then excused from all practices for four days. When they were retested, they showed significant gains in P.F.I. (and S.I. of course), and played well in the final game of the season.

SPECIAL CASES

1. A 16-year-old boy weighing 162 pounds, had grip scores of 35 and 36 pounds, due to no deficiency which could be discovered other than lack of exercise. He was given a rubber ball to squeeze—in three months his grip strength had increased to 110 pounds with each hand.

2. One of the football players mentioned above had a P.F.I. of 119 before the season began. Early in November he was retested—his score dropped to 109. He rested five days, when his P.F.I. returned to 120.

3. A boy whose P.F.I. was 121 became ill—nausea—headaches. A retest showed his score to be 102. Doctors were baffled, but the physical director insisted, since the P.F.I. had dropped so far, that something was wrong. Finally an oculist was visited who discovered that the lenses in his glasses had twisted in their frames. Ten days later he was tested again; his P.F.I. had risen to 121.

4. Milking cows all summer raised one boy's grip strength from 126 and 118 pounds to 168 and 160 pounds.

5. A boy whose P.F.I. was 80 was interviewed. He had no recreative activities —studied in all spare time. His parents were interviewed and their cooperation enlisted. Three months later his P.F.I. had risen to 102.

This boy had been a difficult case, did not enjoy play or living. Was called "Shakespeare" by classmates. Could not throw or catch balls. He is now a normal lad.

6. A seriously overweight boy was caught in time. His scores were:

September	weight, 190	P.F.I. 73
November	weight, 186	P.F.I. 98
February	weight, 185	P.F.I. 101

This boy was graduated out of the corrective class, but feels so much better for his training that he has begged to remain in another term.

7. W.F. was a social problem—did not like physical education—independent—insolent to teachers and parents. His P.F.I., in corrective class, rose from 81 in September to 90 in November, to 139 in February! He was determined to "show the physical director what he could do." *He is no longer a problem.*

8. R.S. is a boy who was never out for sports before last year. A P.F.I. of 156 marked him as unusual. He joined the cross-country squad. His P.F.I. dropped to 147 in November but jumped to 182 in February. He is now the school's Number One Man in cross-country.

9. R.T. was discovered to have a P.F.I. of 222. He is 16 years old, height 64½ inches, weight 106 pounds. He lifted 920 pounds with his legs. We imagined that there was some mistake and retested him a few days later. Every score was about the same before, except leg strength which was 15 pounds higher. His P.F.I. was again 222—an extraordinary proof of the high reliability of Melrose testing.

The Measurement and Reporting of Results of Corrective and Developmental Physical Education*

By William H. Whiting

In 1931, the Quincy Superintendent of Schools and Director of Physical Education, believing that their local physical education program would be improved by certain changes, invited a specialist in health education to survey the local programs and recommend modifications.

Out of this survey came a *redirection* of one phase of the program: the organization of classes, modification of programs, and assignment of pupils to meet their individual health needs, and particularly the needs of those pupils whose physical fitness was low.

The program finally adopted classified pupils into three groups: those whose vitality was low or who had specific remediable defects, those whose general health was average with no remediable defects, and those whose health was excellent. It was planned that the "low group" pupils, whether tenth, eleventh, or twelfth graders, should attend physical education classes four days weekly; the "average group" pupils, should attend gymnasium classes one day weekly and participate in intramural or interschool sports; and the "superior group" pupils should engage only in sports after school.

To carry out this program effectively, several steps were taken which might seem to observers well nigh impossible. In the midst of the depression, additional gymnasium space was secured, teachers were employed, apparatus for testing purchased, tests given, and special follow-up examinations by physicians made. During the summer, the high school principal cooperated by reorganizing his school program—in an already overcrowded building built to accommodate fifteen hundred pupils, and, in 1932, accommodating twenty-two hundred. Pupils were assigned to physical education programs in accordance with their physical needs for the first time in the history of the school, and the program went forward as planned.

These developments involved the active cooperation of the School Committee in providing funds, of the Superintendent in analyzing and approving procedures, of the school health service staff in making examinations, etc., etc.

* This article is a condensation of a pamphlet, *A Report of Progress*, prepared in 1933 for the Quincy, Massachusetts, Superintendent of Schools, James N. Muir, and his School Committee.

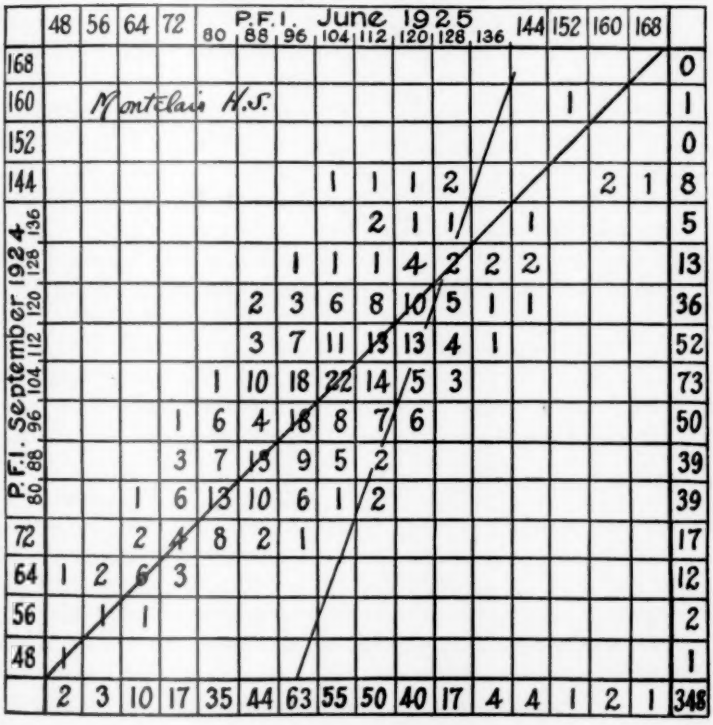
But what about results? Did the project pay? We may anticipate the conclusions of this report by quoting from the Superintendent's Report, *Some Facts Concerning the Public Schools; A Message to the Citizens of Quincy*. Speaking of the corrective program about to be discussed here, Mr. Muir said: "This item alone, in the physical betterment of Quincy's boys and girls, justified the money that has been spent in the whole experiment . . . The fundamental principle and purpose of the entire physical education program in the Quincy school system is to . . . provide the individual with that training which meets his individual needs. No two children are alike physically or, for that matter, in any other way, and to treat them as if they were is a grave injustice."

CHART I

BOYS' PHYSICAL FITNESS INDICES

Montclair High School

"Regular" Physical Education Classes



P.F.I. Sept. 1924 \ P.F.I. June 1925	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	
168																	0
160														1			1
152																	0
144								1	1	1	2				2	1	8
136									2	1	1		1				5
128							1	1	1	4	2	2	2				13
120						2	3	6	8	10	5	1	1				36
112						3	7	11	13	13	4	1					52
104					1	10	18	22	14	5	3						73
96				1	6	4	16	8	7	6							50
88				3	7	13	9	5	2								39
80			1	6	13	10	6	1	2								39
72			2	4	8	2	1										17
64	1	2	6	3													12
56		1	1														2
48	1																1
	2	3	10	17	35	44	63	55	50	40	17	4	4	1	2	1	348

The purpose of this Report is to outline progress since May, 1932, in adapting physical activities to the physical needs of individual pupils in the Quincy Senior High School. *This report covers only one phase of the program: the correction of defects and improvement of vitality or physical fitness of those pupils most in need of guidance.* It would be highly

improper for readers to assume that the Quincy physical education program neglects other phases—for the development of social character, leisure-time interests, etc.

THE PROGRAM

In May, 1932, all pupils in the city who would study in September in the Quincy Senior High School were given strength and footprint tests. Immediately thereafter, those whose P.F.I.'s were below 85 were given thorough medical examinations to determine the causes of their low vitality. In September these pupils, and others who had flat feet, poor posture, or other physical defects, numbering 240 boys and 239 girls, were assigned to special physical education classes, each of which met four times weekly. To accommodate these special groups, new quarters were opened or rented in addition to the regular gymnasium areas in the High School, and the staff was increased and reassigned to care for the additional work entailed.

During the fall term these pupils with low vitality, or with flat feet or other physical defects, were given special activities designed to remove their deficiencies. Due to certain circumstances, over some of which the physical educators had no control, the corrective and developmental programs were somewhat handicapped, especially those for girls. There was, too, some confusion in the minds of teachers and others as to proper procedures. These administrative handicaps to effective programs may be overcome in the future.*

In general, pupils were given, during some part of each period, activities "more or less" specifically suited to their particular defects. During the other part, a general program of gymnastics, games, and sports was provided. The school physician, nurse, and dean of girls observed the conduct of classes several times during the term. It was apparent to them that, in many cases, pupils were not receiving the individual variations in programs which would be necessary adequately to meet their particular needs. These defects have been overcome in subsequent years.

It is especially noteworthy that the instructor for boys had an individual conference during October with each pupil, and that the instructor for girls did likewise, though with fewer girls and not so formally.

In January, all pupils in special classes were re-examined by physicians and retested by means of strength and pedograph tests. The results of these tests have been summarized and analyzed, and provide data for recommendations.

Comparisons of May, 1932, and January, 1933, Measurements Medical Examination Records.—Physicians' reports were somewhat indefinite due to the nature of their examinations and records. In general they report "improved condition," "general attitudes good," "posture improvement especially noticeable," "headaches fewer and menstrual

* The full report, of which this is a summary, discusses these points in detail.

conditions, dysmenorrhea and amenorrhea, greatly improved, for a few cases especially."

Physical Fitness Index Records.—The boys' records show, for 161 pupils tested in May and January, an average (median) increase of 21 P.F.I. points, or 26.6 per cent. The medians in May and January were 78.9 and 99.9.

The girls' records show, for 133 pupils, an average increase of 13.4 P.F.I. points or 19 per cent. The medians were 70.8 and 84.2.

It is significant that pupils whose P.F.I.'s were lowest improved least, though most of them were physiologically capable of improving most. Only 7 of 161 boys, and 1 of 133 girls showed any appreciable loss of fitness. Over 20 boys and 20 girls showed gains of over 50 per cent in physical fitness during the term.

Footprint Records.—Measurement of foot conditions is still in the experimental stage. Consequently all data thereon must be considered of questionable reliability. The following observations may or may not be

CHART II

BOYS' PHYSICAL FITNESS INDICES

Quincy Senior High School

Individual Physical Education Classes

BOYS	30–39	40–49	P.F.I. 50	60	70	80	January 1933 90	100	110	120–129	130–139	
139 / 130											1	1
129 / 120	(1)	Quincy S. H.S.							1		3	4
May 1932 110									4	6	3	13
100							2	1	2	3	4	12
90							1	4	3	2		10
80				1	1	3	10	10	4	5	1	35
70				2	3	5	20	10	4	3	(1)	48
60				3	5	7	6	2	1	1		25
P.F.I. 50				1	1	2	1			(1)		6
49 / 40			3	1								4
39 / 30	1				1		(1)					3
	1	0	3	8	11	17	41	27	19	21	13	161

significant: The boys in corrective classes whose feet were measured increased in arch-angles about 8° or 39 per cent for 75 cases. The average increase for girls was 4.1° or 21 per cent for 65 cases.

INTERPRETATIONS OF STATISTICS

Boys.—The relativity of all meaningful phenomena renders comparisons essential to the interpretation of the foregoing data. In Montclair, New Jersey, in September, 1924, and June, 1925, P.F.I. tests were given. The September median P.F.I. was, for 347 boys, 105.7. In June it was 104.1, showing a loss of 1.5 per cent during the school year. The Quincy group showed a gain of 21 points or 26 per cent from May to January. Evidently the Quincy program was far more effective in improving the physical fitness of pupils.

The relatively small improvement made by pupils with very low P.F.I.'s indicates that these individuals are serious problem cases for physical educators. Any pupils failing to improve in a program which

CHART III

GIRLS' PHYSICAL FITNESS INDICES

Quincy Senior High School

Individual Physical Education Classes

GIRLS	30–39	40–49	P.F.I. 50	60	70	80	90	100	January 1933 110	120–129	130–139	
139–130												0
129–120	(3)	Quincy S.H.S.										0
May 1932 110												0
100												0
90									1			1
80						1	1					2
70					14	16	22	13	2	1		68
60			1	1	18	11	2	3				36
P.F.I. 50			2	7	2	3	1					15
49–40		1	4	3		1		(1)				10
39–30			1									1
	0	1	8	11	34	32	26	17	3	1	0	133

produces an average gain of 19–26 per cent may be considered to be problems, but those who are already most deficient and who fail to improve offer the most challenging opportunities to teachers.

The fact that several pupils with high P.F.I.'s increased their fitness even further (while taking exercises primarily to improve foot and posture defects) indicates that the human machine is capable of improvement in efficiency far beyond the layman's present conception. It is not unlikely that P.F.I.'s of 150 to 200 are possible, even for many who, today, loaf along with one-third to one-fourth the physical power they might possess. Whether such high P.F.I.'s are proper is a question which cannot be answered here or from the data at hand.

Girls.—The average gain of 19 per cent for the girls was one of the most surprising revelations of the statistical summary, because of the handicaps under which their program labored. It is especially remarkable that but one girl definitely declined in fitness during the term. Under ordinary circumstances, that is, before the present program was instituted, at least 40 girls would have declined in fitness. The relatively large gains made by many girls indicate the possibility of great improvement in fitness for most girls in high schools today. The considerable increases in arch-angles indicate that foot conditions may, in a great majority of cases, be improved.

Boys and Girls.—The greater increases for boys may be due to many causes. Better facilities for boys' work probably is the greatest single factor.

STATEMENTS BY PUPILS, TEACHERS, AND OTHERS

Pupils.—Studies of individual cases provide especially interesting information. Pupils whose P.F.I.'s increased 30, 40, and 50 per cent reveal a new interest in living. They appear more cooperative and otherwise more effective socially. Disciplinary problems are practically nonexistent. Pupils who grumbled in September over the 4-day-per-week requirement now are thankful for its benefits. The typical response of girls who had improved greatly in P.F.I. was, "I feel more like *doing* things!"

Teachers.—The boys' instructor in charge of corrective classes confessed to a complete change of opinion after the first term's experience with the measurement-classification-individual needs program. At first frankly skeptical, he has become convinced of its merits. It has "revolutionized" the attitudes of many boys towards physical education.

The teacher in charge of girls' classes reports that "the results of the tests are very gratifying to me," for "both teacher and pupils are now working together toward a purposeful goal: healthier, happier individuals living a fuller and better adjusted life."

Supervisor of Physical Education.—The supervisor of physical education reports that "the personal appearance and conduct of pupils in corrective classes improved markedly. . . The morale of the entire de-

partment was lifted. . . Class organization improved. . . Medical examinations were more carefully given. . . P.F.I. increases were larger than expected. . . Improvement in social efficiency was remarkable. The outstanding event was the individual conference. . . A surprise and pleasure to have so few objections by parents and pupils. . . Augurs well for the future. . ."

CHART IV

BOYS' ARCH ANGLES

Quincy Senior High School

Individual Physical Education Classes

Boys	0–4	5–9	Arch Angles 10	15	20	January 1933 25	30	35	40	45–49	50–54	
50–59											2 (2)	4
45–49	(2)	Quincy S. H. S.								1		1
May 1932 40									1		1	2
35						1		3	1			5
30				1			4					5
25				1	1	7		1				10
20				2	1	2	2	6			(1)	14
Arch Angles 15			1	3	1	2	5	2	1	1		16
10			4	3		4		2				13
5–9				1	1	1						3
0–4			1	1								2
	0	0	6	12	4	17	11	14	3	2	6	75

Surveyor.—In the surveyor's opinion, an outstanding result of the new program at Quincy was the improvement in social efficiency of pupils and staff. Concerning the pupils, no teacher or other commentator failed to remark on their improved spirit of cooperation. To various individuals it was apparent that pupils had gained in courage, perseverance, and initiative. Certainly pupils were more "healthfully concerned" for their own health and efficiency. Concerning the staff, only those who witnessed the growth in *esprit* can appreciate the gains in this field. Individual teachers became better understood by pupils. Instructors cooperated among themselves more harmoniously and effectively. Instructors, dean

of girls, school physician, principal, and director became a unit working toward a common goal, when formerly they were independent workers hoping for the approach of diverse goals. These were not ultimate objectives of the program. But their achievement was necessary to the improvement of pupils' physical fitness; therefore, the achievements came!

The most broadly significant effect of the corrective program was the increase in vitality of pupils. It must be noted that superintendents of schools, principals, and even physical educators lacking intimate knowledge and experience in physical fitness testing can form no true conception of the significance of P.F.I. increases of 50 per cent. Individuals so changed are like different persons. Their skins clear, their eyes sparkle, their posture becomes more erect, their mental alertness increases. Time after time individuals whose P.F.I.'s had increased over 50 per cent replied to the question, "*How* do you feel different?" by the declaration noted above, to wit, that they "felt more like ***doing*** things." Now, "doing things" is living—doing more things is living more. It must be granted, then, that the Quincy Senior High School physical educators, in their corrective classes, have performed a signal service, for their pupils are now eager to "live more abundantly."

RECOMMENDATIONS

Several recommendations are proposed further to improve the effectiveness of special classes for physical development in the Senior High School. The most important of these are the following:

a) Methods of conducting special classes should be reviewed by physical educators and others in special meetings with the purpose of exchanging opinions, determining the most effective procedures and planning programs for the future.

b) Facilities for providing more effective programs should be arranged. These include especially cots, full-length mirrors, sponge-rubber mats, plinths, and more secluded or quiet rooms for girls' corrective activities.

c) Pupils whose P.F.I.'s on retests are above 95 should be "graduated" from the special 4-day-per-week program for the second semester.

d) More determined efforts should be made to raise the fitness of pupils who remain in the special classes.

Though the results speak for themselves, this summary would not be complete without a formal statement concerning the spirit of cooperation and general effectiveness of all who participated in the testing and corrective programs, counseling, and criticism of procedures. Everywhere and almost always, the prevailing attitude was one of desire to aid in the project, to avoid friction, and to discover the truth. The willingness of former skeptics to admit their change of mind is not the least wholesome sign. It augurs well for the greater success of future programs.

RECAPITULATION

Between September, 1932, and January, 1933, nearly five hundred pupils in the Quincy Senior High School, selected by various tests during the previous spring as those most in need of corrective procedures, attended special physical education classes four periods per week. The primary purposes of teachers were to improve physical vitality, correct defects, and develop pupil morale. Activities were closely supervised by trained instructors, working under some handicaps which may be removed in future classes.

Retests and statistical analyses in January revealed that these five hundred pupils, *who otherwise would have suffered an average decline of from one to five per cent in physical fitness,* actually improved an average of over 20 per cent. Many improved as much as 50 per cent. The social or moral tone of individuals and classes improved markedly. Pupils gained a new and deserved respect for, and confidence in, physical education. The *esprit* of the staff was likewise greatly advanced. These gains should be gratifying to the Quincy Superintendent of Schools and School Committee who endorsed and financed changes in policy and procedure in the physical education program of their Senior High School.

Effects of Various Physical Activities on the Physical Fitness of University Men

By Donald H. MacKenzie

INTRODUCTION

THE prime purpose and values of college and university physical activity programs are to conserve physical fitness, provide recreational relaxation which will keep bodies and minds fit and alert, maintain students in good health so they may make the best uses of collegiate training. All other aims and values are supplementary, or of secondary importance, to these.

Unfortunately, college physical educators have tended in practice to ignore these prime values of their program, while as Bobbitt[1] warned in 1918, they have exalted the vital *but secondary* values of socialization or so-called "character training."

Now, even if physical fitness is only one prime objective among many, it is incumbent upon directors of physical education—and even university presidents to—(*a*) maintain for students, opportunities to participate in those physical activities which yield the greatest health values, and (*b*) provide such supervision of these activities as will in fact yield the best results. Therefore, administrative officers must periodically (*c*) investigate the actual effects on students' physical fitness of the activities (sports, military drill, gymnastics, corrective activities, etc.) provided and the supervision maintained.

In the experience and from research of the writer it seems that these administrative functions have seldom if ever been performed, except in a very casual and subjective manner.

The guiding purposes of this study then, are three:

1. To report the results of an objective investigation of the effect on physical fitness of various physical activities for freshmen at Northeastern University during the fall and winter of 1934–1935.

2. From the findings thereof, to draw conclusions and make recommendations leading to: (*a*) the improvement of supervision in activities continued, (*b*) the extension of facilities for the most productive activities, (*c*) a background of facts which will guide student advisers and students in selecting activities for future development.

3. To stimulate college and university directors of physical education elsewhere to conduct similar studies, to the end that the most pro-

[1] Franklin Bobbitt.

ductive activities and the most efficient methods of supervision and instruction will be incorporated in every institution of higher learning.

From another point of view the study derives special significance. During the past few years considerable discussion has taken place among educators regarding the value of physical education courses for college freshmen. Some observers assert, without any objective proof whatsoever, that these courses are "very beneficial" to the students while others claim that, *as the courses are set up at the present time*, there is very little value derived from them. These claims, too, are largely unsubstantiated. The recent report of the Carnegie Foundation,[2] however, which indicates that the general cultural content of college seniors is no higher than that of freshmen, might easily be paralleled in lack of physical improvement as students prepare themselves for degrees and life work! College administrators ought to know the facts.

It was with these aims in mind that the research reported here was undertaken.

PROCEDURE

Various methods of measuring physical condition and changes that take place in condition from time to time are available. The method used in this research was Physical Fitness Index testing, and analysis of test results "before and after" activity programs were followed. Freshmen were measured by this test at the beginning, at the middle, and at the end of the course. The changes that took place between tests were used as the measure of improvement or decline in the student's general health. The validity of P.F.I. technic has been well established over a period of ten years' experimenting and practical application on hundreds of thousands of school boys, girls, and men. Its application to the college level was the subject of G. N. Messer's doctor's dissertation.[3]

After being tested the students selected activities according to their preferences and with the counsel of university officers. They remained in these activities, participating from two to five periods weekly, for ten weeks, when they were retested. They then chose new activities (or continued in the same ones) for another ten-week period, after which they were given a third test. The test results were then analyzed.

In detail, procedures were as follows:

1. All freshmen at Northeastern University are required to undergo a thorough medical examination upon entering school. They are not allowed to participate in any physical activities until this has been done.

2. Physicians were requested to examine each student and note any defects or condition which should bar the students from taking the strength tests. Conditions deemed sufficiently serious to restrict students from taking tests are as follows:

---

[2] B. D. Wood.

[3] G. N. Messer, Critical Analysis of the Application of the Rogers Physical Fitness Test to Williams College Students. New York University, 1932.

heart trouble, hernia, rupture, recent appendix scars, and any other serious and recent illness.

3. If the examining physician felt that the student's condition was satisfactory, he then took the seven tests which comprise the strength test battery.

4. If, on the other hand, the physician felt that the student's health was such that it would be unwise for him to take strength tests he was restrained until such time as the doctor felt his condition had improved sufficiently to remove any element of danger to the student.

5. P.F.I. tests were given at the gymnasium of Northeastern University on September 7 and 8, 1934. They were repeated again on November 19 and 20, 1934, and also on January 28, and 29, 1935.

6. At Northeastern University all freshmen are required to complete a twenty-week physical education course. Students select the particular activity in which they wish to participate. There are eight options in each ten-week period as follows:

First Half	*Second Half*
September 7 to November 19	November 20 to January 28
Abdominal Class	Abdominal Class
Low Physical Fitness	Low Physical Fitness
Gym Class	Gym Class
Swimming Class	Swimming Class
Wrestling Class	Wrestling Class
Track	Track
Cross-Country	Hockey
Football	Basketball

7. At the close of each period a list of participants was obtained from each coach and instructor for his activity. These lists were used in determining the P.F.I.'s of each group.

GENERAL RESULTS

FIRST PERIOD

The general results of the first ten-week period are reported in detail in Table I involving 282 men who were tested and retested. P.F.I. changes are pictured graphically in Chart 1. It is important to note first the high average P.F.I. of the entire group: 106.2. This average practically guarantees the existence of two conditions; first, that tests were efficiently administered, and second, that the general fitness of the Northeastern freshmen is phenomenally high. Averages elsewhere range from 90 to 98. Readers familiar with P.F.I. technic and average scores of high school seniors and college men will recognize the importance as well as significance of this high beginning average.

Though the numbers of students in some groups were small, certain definite trends seem clearly evident. A few of these are noted below:

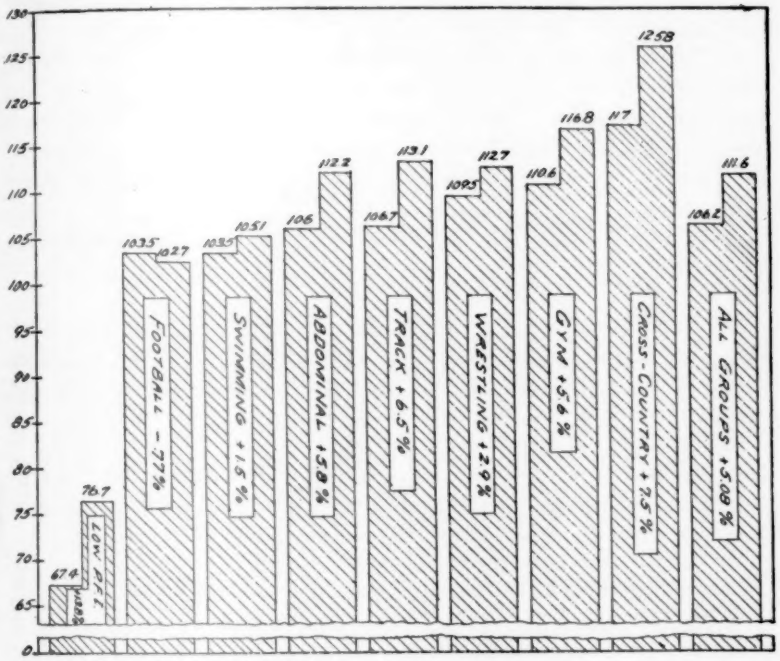
1. The average P.F.I. for the entire group rose from 106.2 to 111.6. This increase was quite unexpected—it may even be accurately described as remarkable, considering that the tendency of average students in the average physical education and academic program in grades 9 through 16 is to lose in P.F.I. during the fall and winter months. But these Northeastern students were already far above the average, due to heavy summer working programs. To improve further is not only

TABLE I
MASTER CHART SEPT.—NOV. P.F.I. DATA

		Age	Weight	Height	Arm	Leg	Back	Left	Right	Lung	S.I.	N.S.I.	P.F.I.
Abdominal	Sept. Ave.	18–11	144.1	67.9	340.	750.	459.	98.1	110.0	262.	2014.	1937.	106.
	Nov. Ave.	19–1	146.3	68.3	374.	787.	533.	102.6	115.8	271.	2184.	1977.	112.2
21 Cases	Change	2	2.2	.4	34.	37.	74.	4.5	5.8	9.	170.	40.	6.2
Low P.F.I.	Sept. Ave.	18–4	169.7	68.7	120.	656.	408.	95.1	101.7	259.	1607.	2384.	67.4
	Nov. Ave.	18–6	172.0	69.1	197.	748.	482.	96.4	110.0	256.	1850.	2466.	76.7
11 Cases	Change	2	2.3	.4	77.	92.	74.	.7	8.3	—3.	243.	82.	9.3
Gym	Sept. Ave.	18–7	137.1	68.0	367.	676.	444.	94.5	105.6	261.	1950.	1780.	110.6
	Nov. Ave.	18–9	139.0	68.3	387.	737.	493.	100.8	109.5	263.	2100.	1820.	116.8
97 Cases	Change	2	1.9	.3	20.	61.	49.	6.3	3.9	2.	150.	40.	6.2
Swimming	Sept. Ave.	18–8	140.1	68.6	259.	680.	445.	91.	103.3	259.	1846.	1844.	103.5
	Nov. Ave.	18–10	141.7	68.8	319.	682.	479.	93.5	107.8	255.	1930.	1886.	105.1
30 Cases	Change	2	1.6	.2	60.	2.	34.	2.5	4.5	—4.	84.	42.	1.6
Wrestling	Sept. Ave.	18–9	142.6	67.6	357.	750.	453.	100.9	113.4	264.	2038.	1907.	109.5
	Nov. Ave.	18–11	144.8	68.1	390.	774.	491.	109.6	120.3	267.	2154.	1946.	112.7
8 Cases	Change	2	2.2	.5	33.	24.	38.	8.7	6.9	3.	116.	39.	3.2
Track	Sept. Ave.	18–8	145.6	68.8	385.	736.	453.	103.2	109.5	274.5	2065.	2014.	106.1
	Nov. Ave.	18–10	147.2	69.1	422.	803.	517.	105.1	115.1	272.5	2241.	2056.	113.0
74 Cases	Change	2	1.6	.3	37.	67.	64.	1.9	5.6	—2.	176.	42.	6.9
Cross Country	Sept. Ave.	18–6	135.	66.8	400.	701.	460.	94.3	109.6	255.2	2021.	1731.	117.
	Nov. Ave.	18–8	136.9	67.1	392.5	812.8	540.	98.1	110.9	251.2	2196.	1773.	125.8
14 Cases	Change	2	1.9	.3	—7.5	111.8	80.	3.8	1.3	—4.	175.	42.	8.8
Football	Sept. Ave.	18–4	151.6	68.9	457.	759.	503.	106.0	117.7	288.	2229.	2187.	103.5
	Nov. Ave.	18–6	155.6	69.2	401.	840.	547.	110.7	117.6	280.	2296.	2269.	102.7
27 Cases	Change	2	5.0	.3	—56.	81.	44.	4.7	—.1	—8.	67.	82.	—.8
All Groups	Sept. Ave.	18–7½	142.9	68.3	359.	708.	453.	98.0	108.2	267.	1986.	1924.	106.2
	Nov. Ave.	18–9½	144.9	68.6	383.	767.	508.	102.2	112.4	266.	2141.	1970.	111.6
282 Cases	Change	2	2.	.3	24.	59.	55.	4.2	4.2	—1.	155.	46.	5.4

excellent evidence of the character of their physical education and academic programs but also a *new proof that college students as a rule do not even remotely approach their potentialities for work and study.*[4]

2. The "low P.F.I." group had the greatest gain. This might be expected, for these men were furthest removed from their potentialities.



1ST PERIOD - P.F.I CHANGES
CHART I

However, those familiar with the physical and temperamental nature of low P.F.I. men know that these often are the most difficult cases to "treat."

3. The football group had the least gain—it was, indeed, a loss. When the activity was analyzed this loss explained itself.

4. Swimming and wrestling, two normally violent or all-round activities, had small gains. These results were surprising but easily explained when investigated.

5. The cross country group had the highest beginning average, namely, 117. They had the second greatest gain, as their P.F.I. in November was 125.8.

6. The abdominal and gym classes both had a P.F.I. gain of 6.2 although they had different starting averages.

[4] In connection see Giauque's comment on page 269.

At this point the reader must have asked himself the questions, "But how were these activities conducted? Were facilities ample? Were classes large or small? Were instructors attentive or careless? Was the program well organized or not? What were actual teaching technics in each case? Did students in, say, football, lose strength in all parts of the body or only in some parts? What parts? How about changes in other activities?"

These are perfectly proper questions. The first great contribution of the study is to demonstrate how concentratedly the questions are focused by the measurement program. They had never before been raised at Northeastern University, except in a perfunctory and routine way, for it was known in advance that no authoritative answers could be given.

Later in this study brief attention is given to these questions for each activity.

SECOND PERIOD

At the close of the first period students relaxed for a few days, after which they selected activities for the second period. Of these 228 cases were retested in January. General results are reported in Table II and Chart 2.

Brief comments on results are given below:

1. The continued rise in P.F.I. from the high average of 106.2 in September to 111.6 in November to 117.1 in January serves to confirm many tentative observations made above:

a) Testing must have been efficient throughout.

b) The high P.F.I. in September was not erroneous or accidental.

c) The Northeastern physical education and academic program is extraordinarily efficient when judged according to its effects on general health, physical fitness, capacity for activity or "life more abundantly."

d) College students generally throughout the nation whose P.F.I.'s drop from year to year probably (1) loaf unnecessarily, or (2) overstudy, thus straining themselves physically.

2. The hockey squad had the greatest gain. This gain was 8 points from 117.3 to 125.3 which was the third highest average P.F.I. obtained by any group in either period.

3. The "low P.F.I." group increased 5.9 points to an average of 79.3 in January. This gain was a drop of 3.4 from the gain registered in the first period by this same group.

4. The gym group increased 6.2 points. This is exactly the same gain that was made in the first period by the gym group.

5. Wrestlers showed the least gain. They had an increase of only 1.8 points. This is very small when one considers the amount of activity that is normally associated with this sport, but when one checks the conditions of the activity as conducted at Northeastern the reason becomes evident.

TABLE II

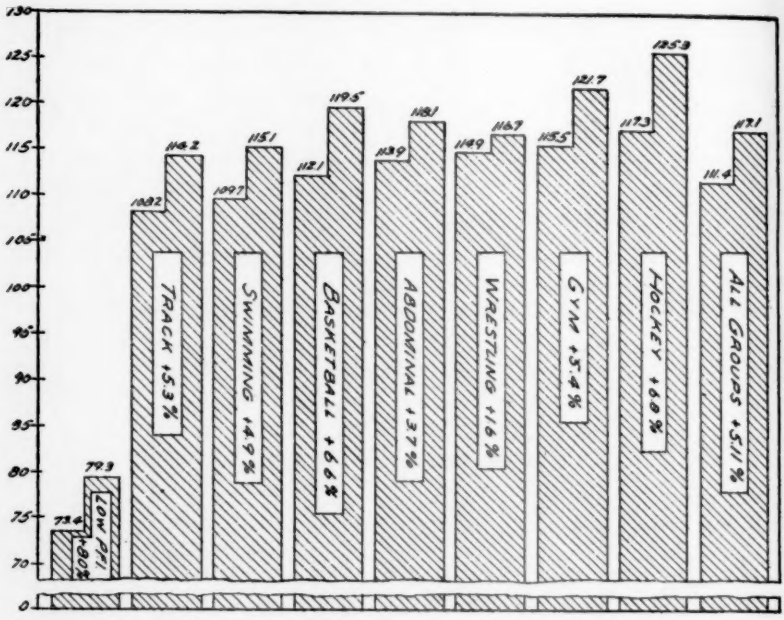
TABLE II

MASTER CHART NOV.—JAN. P.F.I. DATA

		Age	Weight	Height	Arm	Leg	Back	Left	Right	Lung	S.I.	N.S.I.	P.F.I.
Abdominal	Nov. Ave.	19–9½	146.3	68.7	403.5	795.	529.7	102.3	114.7	273.7	2218.9	1983.8	113.9
	Jan. Ave.	19–11½	146.9	68.9	433.3	842.7	548.3	103.1	118.9	270.9	2310.5	2002.6	118.1
15 Cases	Change	2	.6	.2	29.8	47.7	18.6	.8	4.2	—2.8	91.6	18.8	4.2
Low P.F.I.	Nov. Ave.	18–4½	173.7	69.1	165.8	675.6	480.	95.5	110.8	249.8	1784.9	2493.6	73.4
	Jan. Ave.	18–6½	171.4	69.3	189.6	772.5	490.1	103.8	105.5	256.	1918.	2480.8	79.3
8 Cases	Change	2	—2.3	.2	23.8	97.1	10.1	8.3	—5.3	6.2	133.1	—12.8	5.9
Gym	Nov. Ave.	18–8	140.6	68.2	391.	741.7	492.5	99.7	108.5	265.7	2099.3	1845.9	115.5
	Jan. Ave.	18–10	141.2	68.3	419.	808.3	534.1	104.6	114.1	264.0	2242.7	1867.4	121.7
108 Cases	Change	2	.6	.1	28.	66.6	41.6	4.9	5.6	—1.7	153.4	21.5	6.2
Swimming	Nov. Ave.	18–9	140.8	68.0	321.2	698.1	481.7	90.9	106.4	254.6	1958.7	1855.8	109.7
	Jan. Ave.	18–11	141.5	68.2	344.3	764.1	511.7	102.3	110.3	251.5	2090.7	1878.6	115.1
24 Cases	Change	2	.7	.2	23.1	66.0	30.0	11.4	3.9	—3.1	132.0	22.8	5.4
Wrestling	Nov. Ave.	18–11½	151.0	68.7	477.5	839.1	520.0	108.3	120.3	281.9	2347.	2069.1	114.9
	Jan. Ave.	19–1½	151.9	68.8	477.6	865.	584.1	114.5	122.5	278.6	2442.4	2100.1	116.7
11 Cases	Change	2	.9	.1	.1	25.9	64.1	6.2	2.2	—3.3	95.4	31.0	1.8
Track	Nov. Ave.	18–10	148.7	69.7	389.6	707.3	506.4	103.1	115.6	277.5	2189.4	2077.4	108.2
	Jan. Ave.	19–0	152.1	69.8	416.5	853.7	560.0	108.9	122.4	280.7	2342.1	2096.7	114.2
34 Cases	Change	2	3.4	.1	26.9	146.4	53.6	5.8	6.8	3.2	152.7	19.3	6.0
Hockey	Nov. Ave.	18–2	136.3	68.7	422.	760.	521.7	102.	111.6	246.6	2162.	1741.	117.3
	Jan. Ave.	18–4	136.7	69.3	448.6	800.	573.3	102.	120.	242.	2286.	1755.	125.3
13 Cases	Change	2	.4	.6	26.6	40.	51.6	0.	8.4	—4.6	124.	15.	8.0
Basketball	Nov. Ave.	18–6	144.7	68.6	369.1	794.7	497.3	103.9	112.7	273.1	2150.8	1925.4	112.1
	Jan. Ave.	18–8	145.1	68.7	411.2	845.5	561.0	107.5	116.8	270.4	2312.4	1939.6	119.5
15 Cases	Change	2	.4	.1	42.1	50.8	63.7	3.6	4.1	—2.7	161.6	14.2	7.4
All Groups	Nov. Ave.	18–9	144.8	68.6	377.3	756.9	498.5	100.0	111.2	267.5	2112.4	1940.4	111.4
	Jan. Ave.	18–11	145.8	68.7	403.6	817.5	540.4	105.7	115.9	266.6	2249.1	1965.4	117.1
228 Cases	Change	2	1.0	.1	26.3	60.6	41.9	5.7	4.7	—.9	136.7	25.0	5.7

6. Swimming showed a gain of 5.4 points or three and a half times the first period gain. This was caused by a change in the type of activity participated in by the students.

7. The basketball squad had a gain of 7.4 points. This is contrary to several other researches which have been read by the writer but the reasons will be brought forth later in this study.



2ND PERIOD - PF.I CHANGES
CHART II

BRIEF ANALYSIS OF ACTIVITIES

Abdominal Group

1. This group consisted of students detected by physicians as "having trouble" in "abdominal regions." The most pronounced troubles were protruding abdomens, relaxed abdominal muscles, and post-operative cases.

2. Facilities were ample including a large gymnasium floor, stall bars, parallel bars, horses, and bucks.

3. The program was organized in great detail and on paper at meetings of the physical education staff. The main purpose of the program was to help the students regain control of the muscles of the abdominal region.

4. The group met twice weekly for forty-five-minute periods. Most of the exercises were taken lying on the floor, though considerable apparatus work was included. The group was active most of each period.

5. Changes in each test are reported in Tables I and II. The most outstanding change was in the back lift which increased 74 points in the first period.

6. The reason for the change is possibly that the type of exercises given were very conducive to improvement of the muscles of the back.

7. The most outstanding "difference in change" between periods was in lung capacity which increased 9 points in the first period and lost 2.8 points in the second period.

Low Physical Fitness Group

1. This group consisted of students who had a Physical Fitness Index of 80 or below in the September test.

2. Facilities were ample including a large gymnasium floor, stall bars, parallel bars, horses, and bucks.

3. The pupils had a personal interview with the physical education staff at which time each student had his medical card and his strength test card checked over, and was questioned as to the reason for his low strength score. After this conference an individual program was prepared for each boy who was then called in for a second conference.

4. The group met twice weekly for forty-five-minute periods. The exercises were varied to meet the individual conditions. Some were taken on the floor, some on apparatus and some standing, but all were under the supervision of an instructor.

5. The changes in each test are reported in Tables I and II. The most outstanding change was in the leg lift. There was an increase of 92 points in the first period and 97.1 in the second period.

6. The reason for the change is possibly that the type of exercise given was not favorable to improvement of the muscles of the legs.

7. The most outstanding "difference in changes" between periods was in the back lift with a first period change of 74 and a second period change of 10.1.

Gym Class

1. This group consisted of all students who had not selected or were not assigned to any other activity.

2. The facilities consisted of a large gymnasium one hundred feet in length and fifty feet in width. There were stall bars on one side of this gym. There was a net which could be strung across the floor making two gyms.

3. The program was planned by the physical education staff and consisted of calisthenics of the usual type and games.

4. The group met twice a week for forty-five-minute periods. The first fifteen minutes were given over to exercises and the balance of the time was used for games. Due to the size of the class no apparatus work was given.

5. Changes in each test are reported in Tables I and II. The most outstanding thing about this group is that the changes are very nearly the same as the average for all groups. There were no outstanding changes in individual tests.

6. The most outstanding "difference in changes" between periods was the fact that the P.F.I. increase for both periods was exactly the same, namely 6.2.

Swimming Class

1. This group consisted of students who were unable to pass the swimming test which is given to all entering freshmen at Northeastern University.

2. The swimming pool is twenty-five feet wide and seventy-five feet long. The depth varies from two feet at one end to nine feet near the other end.

3. The program was organized by the swimming instructor. The most important item in the program was to overcome the students' "fear of the water." This was accomplished by gradually allowing the students to try to swim.

4. The group met twice weekly for forty-five-minute periods. The students first practiced the strokes on benches. Then they hung on to the edge of the pool and practiced the kicks. Later they stood in the pool and bent over to practice the arm strokes. When they learned these strokes they were allowed to try to actually swim.

5. Changes in each test are reported in Tables I and II. The most outstanding change was in the leg lift. The increase was only 2 points in the first period as against an increase of 66 points in the second period.

6. The reason for the change is possibly that the practice of the kick was not intensive enough in the first period when the time was divided between arm stroke and the kick.

7. The most outstanding "difference in changes" between periods was in the P.F.I. The increase was 1.6 in the first period and 5.4 in the second period.

Wrestling Group

1. This group consisted of those students who desired to learn how to wrestle. It was an option open to all freshmen.

2. The facilities were a room about fifteen by twenty feet, the floor of which was covered with mats.

3. The instructor, an expert wrestler, planned his program so that the boys would learn the fundamentals of wrestling, as well as have some actual competition.

4. The group met twice weekly for forty-five-minute periods. They practiced making and breaking holds on each other during the first test period. During the second test period they had actual wrestling matches among themselves but as the facilities were inadequate they did not have much more than ten minutes exercise a day. The balance of the time was spent watching the others wrestle.

5. Changes in each test are reported in Tables I and II. The most outstanding change was in the back lift. This increased 64.1 points in the second period as against 38 points in the first period.

6. The reason for the change is possibly that the constant use of the wrestlers' bridge did much to increase the strength of the back muscles.

7. The most outstanding "difference in changes" between periods was in the arm strength where a first period increase of 33 points was recorded against a second period increase of .1 points.

Track Squad

1. This group consisted of students who desired to participate in track and who had been deemed sufficiently capable by the track coaches.

2. The facilities available included a twelve-laps-to-the-mile indoor track, a twelve-lap outdoor board track, and outdoor jumping pit, and a large gymnasium floor on which were practiced the dashes, hurdles, and shot-puts.

3. The program was under the direction of three coaches, one of whom had charge of the field event men. They planned their program so that each student received individual attention every day.

4. The group met four times weekly for one hour periods. The student practiced on his specialty and did whatever other exercise the coaches thought would be useful.

5. Changes in each test are reported in Tables I and II. The most outstanding change was in the leg lift where an increase of 67 points was registered in the first period and 146.4 points in the second period.

6. The reason for the change is probably that the constant running indulged in by this squad greatly increased the strength of the leg muscles.

7. The most outstanding "difference in changes" between periods was in the leg lift. The first period change was 67 compared to a second period change of 146.4.

Cross-Country

1. This group consisted of those men interested in the running of a cross-country course. They were not cut by the coach but a selection was made each week of the seven best men for each intercollegiate race.

2. The facilities available were a five-lap-to-the-mile cinder track, twelve-lap-

to-the-mile board track, and a five-mile cross-country course so mapped out that any mileage from one to five could be accurately measured.

3. The program was organized by the coach in detail and with the training of the students in mind.

4. The group met twice weekly for ninety-minute periods. The first portion of each period was devoted to setting up exercises after which the students ran either on the track or over the cross-country course.

5. Changes in each period are reported in Table I. The most outstanding change occurred in the leg lift and the P.F.I. The leg lift increased 111.8 points while the P.F.I. increased 8.8 points.

6. The reason for the change is apparently due to the exercise that the boys had in practice and in the meets. Constant exercise of the legs seems to improve the strength of the leg muscles.

Football Squad

1. This group consisted of those members of the freshman class that had been selected by the freshman coaches as sufficiently qualified to represent the University in intercollegiate competition.

2. The facilities available included a regulation football field, an extra practice field, equipment of the most modern kind and in sufficient amounts to take care of all the students.

3. The program was organized by the three coaches so that the boys would have the fundamentals of football as well as a number of plays learned when the intercollegiate schedule started on October 7, 1934. The schedule consisted of six games, five of which were won and the other tied.

4. The group met five days weekly for ninety-minute periods. The practice consisted of setting up exercises, fundamental exercises in football, such as tackling and blocking, dummy scrimmages, and actual scrimmages.

5. Changes in each test are reported in Table I. The most outstanding change was in the P.F.I. which decreased .8 points during the first period.

6. The reasons for the changes are possibly that (*a*) the students had too much exercise, (*b*) an increase in weight resulted in an increased norm, (*c*) the players may have been stale when tested, which was three days following the final game, (*d*) as football had the only circled scores it is possible that some of the cases studied should have been circled scores and, therefore, not counted in this report, (*e*) the players practiced between twelve and two so that they played on either a full stomach or an empty stomach.

Hockey Squad

1. This group consisted of students who desired to participate in hockey and who had been deemed sufficiently capable by the coach.

2. The facility available was the hockey rink of the Boston Arena.

3. The program was designed to develop ability to skate and to teach the fundamentals of hockey.

4. The group met twice weekly for ninety-minute periods. The practice was divided between teaching the boys how to skate, how to handle a hockey stick, and the fundamentals of hockey.

5. Changes in each test are reported in Table II. The most outstanding change was the fact that the left grip was unchanged while the right grip increased 8.4 points.

6. The reason for the changes is possibly the method of handling the stick. The left hand is used to guide the stick while the right hand is the driving force in using the stick.

Basketball Squad

1. This group consisted of students who desired to participate in basketball and who had been deemed sufficiently capable by the coach.

2. The facilities available were three gyms, one, one hundred by fifty and the other two, sixty by thirty-five. There was a total of eleven baskets available for practice shooting.

3. The program was designed to develop in the boys an eye for shooting as well as to teach the fundamentals of basketball.

4. The group met four days weekly for sixty-minute periods. They practiced the fundamentals of passing, dribbling, pivoting, and shooting. They also had scrimmages twice a week.

5. Changes in each test are reported in Table II. The most outstanding change was in the arm strength where an increase of 42.1 points was recorded.

6. The reason for the change is possibly that the constant shooting develops the muscles of the arms and back.

SPECIAL CASES

Twelve case reports are included to illustrate special findings which result from measurements, as well as to indicate the general nature of guidance given by the test results.

Track Group. (H. P.)—P.F.I.'s 109, 129, and 148. This boy weighed 128 pounds in September and remained about the same for the course. His gains were due to a general increase in fitness as his Strength Indices were 1756, 2070, and 2381 while his N.S.I. remained the same.

Abdominal Group. (H. C.)—P.F.I.'s 78, 94, and 101. The boy weighed 162, 165½, and 166. His Strength Indices were 1834, 2281, 2453. The increase in P.F.I. was due to a marked gain in strength as his norm also increased.

Track Group. (W. B.)—P.F.I.'s were 142, 162, and 175. The boy was 17½ years old, weighed 117 pounds, and was 66.5 inches tall. The change in P.F.I. was due to a general all-round physical improvement as his norm remained constant.

Wrestling Group. (C. G.)—P.F.I.'s 96, 116, and 131. This was due to an improvement in the leg lift which went from 735 to 1110 and then to 1310.

(B. P.)—P.F.I.'s recorded for this student were 74, 91, and 128. This was due to the special exercises given by the physical director and to a drop in weight of 10 pounds.

(M. C.)—This boy was placed in the low P.F.I. group by the physical director as he had a P.F.I. of 79 in September. This increased to 107 in November and 129 in January due to strength increase as his norm was about the same for all tests.

(R. B.)—September P.F.I. of 78 was regarded as very low for this student. Questioning by the tester revealed that student had been ill for two months with streptococcus infection. Placed in low P.F.I. group and given special exercise. In November P.F.I. was 101. Student left school before January so a third test was not taken.

(E. F.)—The P.F.I. in September was 61. Boy's weight was 226. Placed in special exercise group and although strength had increased by November his P.F.I. had dropped to 55 due to a 9-pound increase in weight. By very close check on student both in and out of school his P.F.I. in January was 67 with a 4-pound decrease in weight.

(J. D.)—In September when being tested for the leg lift this student broke the handle of the back and leg dynamometer with a lift of 1290. His P.F.I.'s were 141–141–130. The last P.F.I. was low due to a sore back as his leg lift went down to 1060.

(G. M.)—The P.F.I.'s for this student were 165–136–161. The low second

score was caused by a bad cold of which the boy complained. He had been sick with it for two weeks.

(F. C.)—A P.F.I. increase from 132 to 159 to 173 was recorded by this boy. This was due to a straight increase in strength as his norm was practically the same for all tests.

(A. P.)—In September a P.F.I. of 47 was recorded for this boy. A careful check-up by the physical education staff revealed that the boy was over-worked and did not have sufficient rest. As a result of the reorganization of daily life his P.F.I. went to 63 in November and 89 in January.

SUMMARY

Comparisons of P.F.I. changes in Northeastern University students in various activities indicate that wide differences in physical fitness are effected by participation in different sports. The data seem to show that *as conducted at Northeastern during September, 1934, to January, 1935,* general corrective programs, exercises to improve abdominal conditions, cross-country, and hockey yielded the greatest dividends in physical development. Football was least productive, but wrestling was not much better.

Comparisons between the two periods seemed to verify the writer's observation during the first period that increase in fitness depends less on the nature of the sport than on the methods used by instructors and supervisors in controlling students' activities. It is, for example, possible to make football much more productive than at present, by changing practice technics, particularly the hour of practice.

What results would occur if supervision were withdrawn from all sports remains an interesting and challenging question to be solved by further research.

It should be noted that this study did not pretend to measure changes in attitudes. Thus the swimming instructor spent nearly six weeks in overcoming his students' "fear of the water." This accomplished, though no great gains in physical fitness were effected, he then set them to swimming, and during the second period their P.F.I. gain was very creditable. Since all athletic abilities depend on considerable strength for adequate performance it would seem wise if the swimming instructor took whatever steps were necessary to increase strength during the first period as well as the second.

The testing and research programs had markedly good effects on many coaches, instructors, physicians, and directors. Knowing that their work would be checked they examined students more carefully, followed up examinations more persistently, and were more active in leading special groups.

The effects on students were remarkable. Not only was fitness greatly improved but also the students' attitudes changed considerably. The students asked many questions as to how they could improve their physical condition. Several "low Physical Fitness" students reported

that they felt much better physically and that they had more pep as their P.F.I. improved. All the students cooperated to the best of their ability with the testers and with their coach or instructor during the twenty weeks of the course.

The tests were the first ever given at Northeastern University. It is the feeling of the physical education staff that the value received was so great that they should have a fixed place in the physical education program.

STATISTICAL ANALYSIS

Tables III and V report the weighted average changes in test scores between September and November and the medians and correlation data. Tables IV and VI report the same data for November-January changes. These data are recorded to facilitate comparisons between activities. The following tentative conclusions are suggested which, of of course, must be verified by other investigations before being at all useful for final conclusions:

1. The high correlations between tests for the abdominal group (.89) together with the increase in P.F.I. of 6.2 would seem to indicate that improvement was fairly uniform for most of this group.

2. In the wrestling group, although the P.F.I. increase was only 3.2 the sigma decreased 2.35 points from 15.80 to 13.45, indicating that the group was more homogeneous in November than in September. While the increase was small yet all the students tended to change alike. The correlation coefficient between tests was .89.

3. Cross-country seems to be the best sport for all-round physical development. This is shown by an increase in strength of 175 pounds. The leg lift increased 111.8 points while the back lift increased 80.0 points. The P.F.I. change was plus 8.8. The correlation coefficient of .80 between tests indicates that the changes were spread over the entire group rather than a few cases having exceptional gains.

4. Football showed a P.F.I. decrease of .8 points. The sigma change was minus 3.80 from 18.50 to 14.70. This would seem to indicate that while there was a slight decrease in fitness the group tended to be more homogeneous at the end of the period than at the beginning. It should also be noted that *the decrease was in P.F.I. and not in actual strength.* There was a gain in strength of 67 points which was, however, not sufficient to offset the norm increase of 82 points.

5. A comparison of the swimming changes between the first and second period seems to indicate that the greatest improvement came not from practicing the stroke and the kick singly in the air, but from actual experience in the water. This is indicated by a strength increase of 84 points in the first period and 132 points in the second period when swimming practice was increased.

6. In the writer's opinion the individual programs of exercise such as used in the "Low P.F.I. group" are the best type of exercise for

TABLE III

SEPTEMBER—NOVEMBER WEIGHTED AVERAGE CHANGE IN SCORES

	Abdominal	Low P.F.I.	Gym	Swimming	Wrestling	Track	Cross Country	Football	All Groups
No. of Cases	21	11	97	30	8	74	14	27	282
Age (Mo.)	2	2	2	2	2	2	2	2	2
Weight	2.2	2.3	1.9	1.6	2.2	1.6	1.9	5.0	2
Height (In.)	.4	.4	.3	.2	.5	.3	.3	.3	.3
Arm Strength	34	77	20	60	33	37	−7.5	−56	24
Leg Lift	37	92	61	2	24	67	111.8	81	59
Back Lift	74	74	49	34	38	64	80	44	55
Left Grip	4.5	.7	6.3	2.5	8.7	1.9	3.8	4.7	4.2
Right Grip	5.8	8.3	3.9	4.5	6.9	5.6	1.3	−.1	4.2
Lung capacity	0	−3	2	−4	3	−2	−4	−8	−1
Strength I.	170	243	150	84	116	176	175	67	155
Normal S. I.	40	82	40	42	39	42	42	82	46
P. F. I.	6.2	9.3	6.2	1.6	3.2	6.9	8.8	−.8	5.4

TABLE IV

NOVEMBER—JANUARY WEIGHTED AVERAGE CHANGE IN SCORES

	Abdominal	Low P.F.I.	Gym	Swimming	Wrestling	Track	Hockey	Basketball	All Groups
No. of Cases	15	8	108	24	11	34	13	15	228
Age (Mo.)	2	2	2	2	2	2	2	2	2
Weight	.6	−2.3	.6	.7	.9	3.4	.4	.4	1.0
Height (In.)	.2	.2	.1	.2	.1	.1	.6	.1	.1
Arm Strength	29.8	23.8	28	23.1	.1	26.9	26.6	42.1	26.3
Leg Lift	47.7	97.1	66.6	66	25.9	146.4	40	50.8	60.6
Back Lift	18.6	10.1	41.6	30	64.1	53.6	51.6	63.7	41.9
Left Grip	.8	8.3	4.9	11.4	6.2	5.8	0	3.6	5.7
Right Grip	4.2	−5.3	5.6	3.9	2.2	6.8	8.4	4.1	4.7
Lung Capacity	−2.8	6.2	−1.7	−3.1	−3.3	3.2	−4.6	−2.7	−.9
Strength I.	91.6	133.1	153.4	132	95.4	152.7	124	161.6	136.7
Normal S. I.	18.8	−12.8	21.5	22.8	31.0	19.3	15	14.2	25
P. F. I.	4.2	5.9	6.2	5.4	1.8	6.0	8.0	7.4	5.7

TABLE V

SEPTEMBER—NOVEMBER P. F. I.—CORRELATION DATA

	Abdominal	Low P.F.I.	Gym	Swimming	Wrestling	Track	Cross Country	Football	All Groups
Sept. Median ...	105.98	67.5	111.27	103.66	110.6	107.91	117.5	103.52	106.4
Nov. Median ...	112.03	78.6	117.14	105.67	112.5	113.31	126.1	103.24	112.17
Median Change .	6.05	11.1	5.87	2.01	1.9	5.40	8.6	−.28	5.77
Sept. Sigma	14.60	11.40	15.63	20.355	15.80	23.87	13.05	18.50	19.885
Nov. Sigma	17.59	14.58	16.5	18.640	13.45	24.16	16.27	14.70	20.540
Sigma Change ...	2.99	3.18	.87	−1.715	−2.35	.29	3.22	−3.80	.655
r	.89	.73	.76	.83	.89	.89	.80	.78	.82
P. E. r	.0306	.0945	.0289	.0383	.0491	.0163	.065	.0508	.0134
P. I. r	.54	.31	.35	.44	.55	.54	.40	.37	.43

TABLE VI

NOVEMBER—JANUARY P.F.I.—CORRELATION DATA

	Abdominal	Low P.F.I.	Gym	Swimming	Wrestling	Track	Hockey	Basketball	All Groups
Nov. Median	113.	73.5	115.9	110.1	115.2	109.4	116.9	112.3	111.6
Jan. Median	118.2	79.5	121.4	115.9	116.7	115.1	125.7	119.4	117.7
Median Change ..	5.2	6.0	5.5	5.8	1.5	5.7	8.8	7.1	6.1
Nov. Sigma	16.41	15.92	16.41	17.95	13.91	18.19	16.51	17.49	20.89
Jan. Sigma	18.72	18.52	17.03	16.91	12.74	19.76	18.93	15.38	22.04
Sigma Change ..	2.31	2.60	.62	−1.04	−1.17	1.57	2.42	−2.11	2.15
r	.91	.77	.77	.86	.87	.84	.80	.79	.83
P. E. r.....	.0337	.0975	.0265	.0358	.0467	.0336	.0545	.0654	.0135
P. I. r	.57	.36	.36	.49	.50	.45	.40	.38	.44

strength improvement. The average increase in strength in the first period was 243 points and in the second period 133.1 points. The total increase for the two periods was 376.1 which is about 50 points higher than track and 75 points higher than gymnastics.

7. The gymnasium group did not increase as much as they should have in arm strength. This was caused by lack of apparatus work. However, the group as a whole had a P.F.I. increase of 6.2 for each period. This fact, together with the fact that the correlation coefficient was almost the same for both periods, indicates that these students all had a steady upward rise in P.F.I. which was sustained over both periods.

8. The track squad had a marked improvement in leg lift for the second period over the increase of the first period. This seems to show that actual increase in leg strength comes more from actual competitive racing than from practice where one is not so forced as in regular competition.

RECOMMENDATIONS

The recommendations listed below are made with full realization that under present conditions at Northeastern University it will not be possible to put some of them into effect. However, they should be kept in mind so that when facilities are improved the changes can be made.

1. The wrestling group should be placed in a larger space so that there will be more opportunity for more members of the group to exercise simultaneously. The space might well be one of the small gymnasiums, suitably equipped with mats.

2. The program of the gymnasium group should include more apparatus work.

3. Crowded gymnasium classes should be avoided by excusing from the required gymnasium course, those students whose P.F.I.'s are over 114 in September. Those excused would be allowed but not required to select some activity.

4. The swimming program should be changed so that the students enter the water as quickly as possible. This means that the instructor will have to develop some method of quickly removing any "fear of the water" that the students may have. This should result in a marked increase in the P.F.I. during the first period and a consequent increase in power to swim. At all events students in this group should have more exercise during the first period.

5. The writer believes that the cross-country squad does not have sufficient arm exercise. These students should be advised to take additional exercises to increase their arm strength. This will probably not affect their cross-country ability greatly but it will increase their general fitness.

6. The football squad's practice periods should come at some other time than between 12 and 2 P.M. This would avoid the unhealthful ex-

pedient of practicing either on a full stomach or on an empty one. The writer believes that neither of these conditions is conducive to improvement in physical fitness—and the test results support this opinion.

7. The program for the abdominal group should be so designed or rearranged that the back muscles receive as much exercise in the second period as in the first period.

8. It is suggested that if the hockey coach would instruct his men how to shoot both left and right handed there would be an increase in the left grip and probably an improvement in playing ability.

9. The "Low P.F.I." group should be checked constantly by both physician and instructors so that as quickly as possible students will have their physical powers brought back to normal. In many cases this will require also investigations of home and living conditions.

10. *All students who have P.F.I.'s of eighty or below in September should be required to enter the "Low P.F.I." group and remain there until they have increased their P.F.I. sufficiently to be removed from the low classification, even if they remain in this classification for two or three or four years.* They should be encouraged to select an interest activity in addition under proper and careful supervision, unless contra-indicated. The interest activities should be those which have a carry-over value into adult life, like tennis or golf.

11. The results of this study should be shown to the students and be thoroughly explained. This should motivate them to select the activity which will be most helpful in increasing their fitness. This also may motivate the students to try harder to improve themselves.

The Effects of Various Summer Programs on Boys' Physical Fitness*

By Arthur L. Jones

THE PROBLEMS

SUMMER months should provide a period of physical recuperation for high school boys. Their indoor life is normally ended. They are freed from the restrictions of class recitations during the day and homework at night. They live in the sun, whether at home or abroad. Public and private camps abound to care for those who cannot easily reach lakes, streams, mountains, or seashore. Fresh fruits and vegetables ripen and drop physically and in price. The open road calls.

The normal expectancy is that, under these stimulating conditions, boys in their teens will thrive physically. Surplus weight should melt off. Exercise should harden muscles and sinews. The sun should turn white bodies brown. Sleep should be deep and sweet. Physical fitness indices of whatever kind—if they are valid measures of capacity for activity—should rise.

Do they?

The most appealing argument of summer camps to parents is their claims that they improve boys' and girls' health. Often they do. Often they do not.[1]

Of course, the traditional measure used by camps to "prove" improvement in health—increase in weight—is quite misleading.[2] For, as almost every parent really knows, many children badly need to lose weight.

How would you rate the various camps attended by your boys, Mr. High School Principal? How effective are local public playgrounds in maintaining children's health, Mr. Mayor? What are the effects of summer activities on your boy, Mr. and Mrs. Parent? What are the relative effects of light and heavy work on physical fitness, Mr. Employer? Shall parents require their sons to work? Or shall summer vacation be held sacred as a period of *re-creation?* Or might it be better, at least as far as health is concerned, to keep schools open during the summer months?

It was to secure some objective data which would aid the writer in

---

* This study is an abstract of a Master's Thesis prepared for the University of Maine. The writer is indebted to Mr. Ralph Noonan, who is an instructor in Framingham Schools, for his assistance in testing.

[1] See articles on camping by Wylie, page 156; Malcolm, page 166; and Wrightstone, page 150.

[2] See Wylie's analysis, page 161–3. (Ed.)

answering these questions more accurately and with some assurance that the present study was undertaken.

No final conclusions can be given, for the complexity and interrelations of the problems render solutions extremely difficult and demand the analysis of perhaps thousands of records. Evidence is presented, however, to stimulate further investigations in this important field of inquiry. A few very tentative conclusions are drawn merely as suggestions to parents, camp directors, and school executives.

THE DATA

To measure changes in physical fitness, strength tests were given[8] in May and September, 1934. P.F.I.'s, and gains or losses therein for each boy, were calculated. Changes in weight were noted too, to demonstrate once more the lack of meaning in reports of weight gain alone.

Immediately following the September tests, boys were interviewed by the author, who is the local physical director. Their summer activities were noted and boys were later classified into five categories, in terms of the probable amounts of physical activity indulged in. This process of classification was subjective, being a "mere" estimate. However, the interviewer spent sufficient time with each boy to determine with more than a fair degree of accuracy whether he had been actively engaged during the summer vacation or whether he had been loafing. The categories were:

1. Loafing—little play and no regular work.
2. Light work—caddying and other intermittent jobs with little interest in other activities.
3. Combination work and play—a regular job for part of each day or part of the summer and some active interest in sports.
4. Heavy work—steady job all day.
5. Active freedom—concentrated activity in some sport or sports or camp.

Complete records were secured for 179 boys. The data for the various groups are reported in Table I. Since weight gains and losses are sometimes thought to be indicative of changes in health, these records are included also.

To provide material for greater insight into the changes in each group, six scattergrams are reproduced in Chart I.

THE RESULTS

1. From the data reported in Table I, it is apparent that inactivity during summer vacation is deleterious to health. For, though the normal expectancy is that boys will improve from 5 to 10 per cent in health, these seventeen boys declined an *average* of 14 per cent. The consequences of these declines are likely to be severely felt during the ensuing school year. Certainly their capacities to work, play, and study

[8] In the Framingham, Massachusetts, High School.

will be greatly reduced. Probably their abilities to withstand or throw off minor infections will be greatly lessened. Certainly, too, most of them will be less happy. These boys would have fared better if they had been put to work at any task.

2. The losses in P.F.I. of the light-work group were small but, on the average, unnecessary.

TABLE I

CHANGES IN PHYSICAL FITNESS AND WEIGHT OF HIGH SCHOOL BOYS DURING SUMMER VACATIONS

Group	Number of Boys	May P.F.I.	September P.F.I.	Gain or Loss	May Weight in lbs.	Sept. Weight in lbs.	Gain
I Loafing "little play and no work"	17	84.3	72.9	— 11.4 points — 14%	137.4	145.0	7.6
II Light Work "caddying and other intermittent jobs"	27	89.4	88.0	— 1.8 points — 2%	127.3	132.3	4.9
III Combination "some job and some freedom"	37	90.3	95.6	+ 5.3 points + 6%	135.4	137.7	2.2
IV Heavy Work "steady job all day"	36	89.2	95.4	+ 6.1 points + 7%	136.4	139.3	2.9
V Active Freedom "several sports or camp"	62	87.8	94.7	+ 6.9 points + 8%	132.9	136.3	3.4

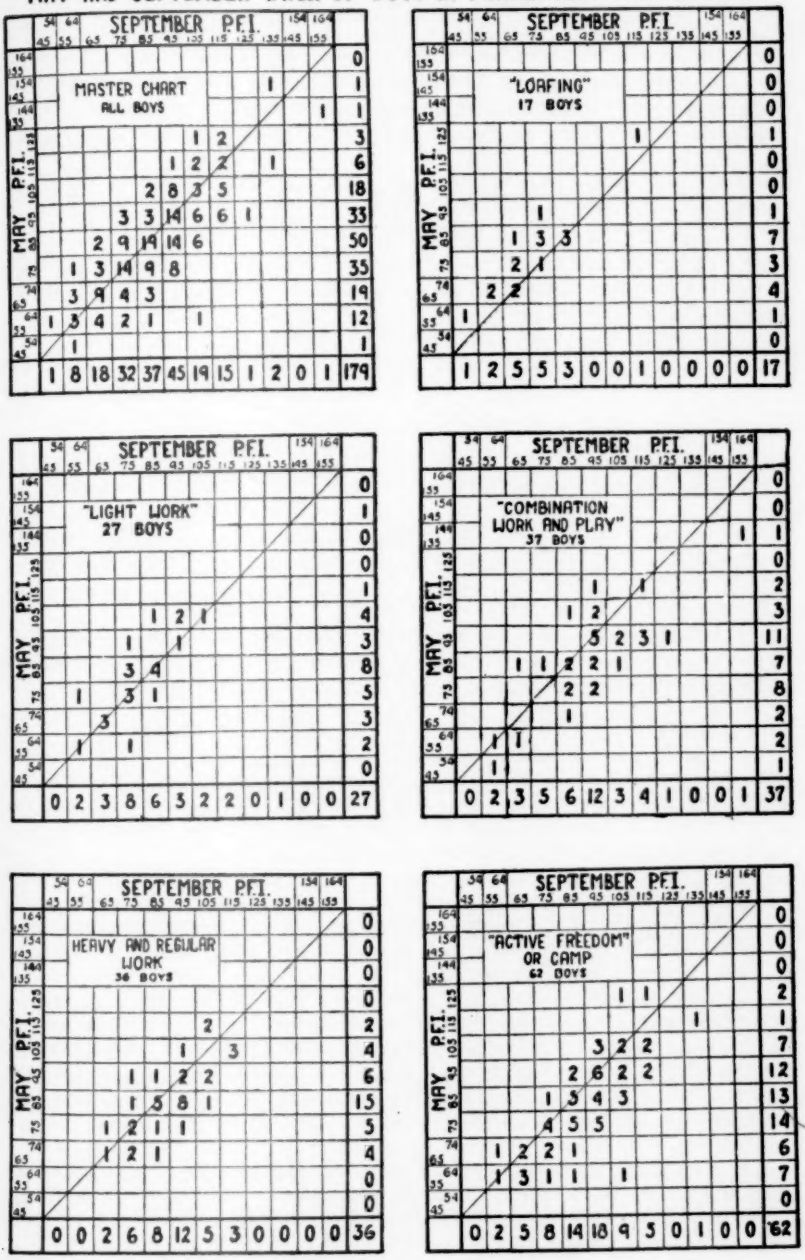
3. The gains of the other three groups are practically identical. That they were not greater may be due to some decline in fitness during the first two weeks of school. (It should be reassuring to those who still question the reliability of strength testing to discover how nearly alike are the findings of Wrightstone, Wylie, and the writer, who was privileged to see their reports.)[4]

4. The scattergrams in Chart I reveal very interesting conditions.

a) Not a single "loafer" gained in fitness during the summer.
b) In all other groups there were both gains and losses.
c) The greatest gains were in the "Active Freedom Group."

[4] The author is indebted to Kenneth H. Murray for the following data from Montreal: 159 boys tested in June and September 1934, median P.F.I.'s 111.66 to 109.6—a loss of 2 per cent. The correlation coefficient between the two sets of data was .66, showing an unusually wide degree of variations between individuals. Evidently some improved greatly while many declined considerably in P.F.I. Why?

CHART I
MAY AND SEPTEMBER P.F.Is. OF BOYS IN FRAMINGHAM HIGH SCHOOL



5. The greatest average P.F.I. losses were accompanied by the greatest average weight gains. The negative correlation here is very high.

6. Statisticians will be interested to note the distribution of boys in the various groups. The writer classified individuals without reference to P.F.I., and without any attempt to assign any proportion of boys to each group; yet a distribution polygon would approximate the normal curve, skewing toward the upper end as would be expected during summer months.

7. That great gains in fitness are possible, is revealed by those made by certain individuals in groups III, IV, and V.

8. Table I reveals, too, that pupils with low, average, or high P.F.I.'s may gain greatly in physical fitness, though, of course, those lowest in May are able to improve most. For example:

TABLE I

	May	*September*	*P.F.I. Gain*	*Per Cent Gain*
Boy in Group V	64	107	43	67%
Boy in Group III	137	162	25	18%
Boy in Group IV	88	110	22	25%

OUTSTANDING CASES

Brief case reports of a few of those whose gains or losses were greatest are included here to illustrate and supplement the bare statistics.

1. E.S., P.F.I., 95 to 80; weight 138 to 146. A case of loafing all summer. This boy considered himself "strong!" He uses "defense methods" in all conversations. The September test revealed his true condition. A talk with E.S. changed his attitudes, mental as well as social. He now is "out" for all sports and probably will improve rapidly in physical fitness, mental balance, and social attitudes.

2. R.G., P.F.I., 131 to 118, weight 111 to 132. Another case of loafing all summer, in spite of a high P.F.I. This is an unusual case in which a boy changed his normal living habits—because he was unsupervised by parents or others? He says "never again!" Possibly a period of rapid growth accounts for the change; but there is no evidence that the condition was normal or desirable.

3. W.R., P.F.I., 66 to 91; weight 130 to 132. A remarkable improvement for a boy in Group IV. His program was general farming for one week followed by swimming, hiking, and tennis for the remainder of the summer. Before the first test was given this boy, he was inclined to be lazy and inactive. Since May his attitude has changed greatly, as proved by test results.

4. D.A., P.F.I., 137 to 162; weight 100 to 96. This is an unusual case. In spite of a high May P.F.I., this boy increased his score very greatly. He did gardening for three weeks and engaged in sports for the remaining weeks. At times this boy has bad attacks of asthma. He is now excused from physical education because of a high P.F.I. His low and declining weight *coupled with* increase in P.F.I. mark him as a real problem case which should be followed carefully by school health officers and teachers.

5. E.T., P.F.I., 75 to 97; weight 111 to 120. This case is notable because of great weight increase with P.F.I. increase. Evidently this boy built muscle tissue, sinews, and bones during his summer, instead of fat. He clerked in a drug store mornings. Every afternoon he went hiking, canoeing, or swimming. The May P.F.I. score warned this boy of his needs and thus helped him to help himself.

6. P.T., P.F.I., 58 to 85; weight 124 to 132. Another case of weight and P.F.I. gain in Group V. Clearly a real improvement in general fitness. P.T. was a socially maladjusted boy. The director counselled with him. After a summer of tennis, swimming, bicycle riding, and baseball, he showed a wonderful change in social attitude as well as physical fitness.

7. U.N., P.F.I., 132 to 112; weight 114 to 122. Group V. This boy reported "baseball all summer" enthusiastically. But his weight gain without a proportionate gain in strength is inexplicable to the writer. Perhaps his "baseball" was as a "left fielder"—standing still most of the time.

8. L.B., P.F.I., 88 to 110; weight 114 to 119. L.B. worked all summer in a store where he was obliged to do much lifting. In spite of a considerable weight gain, his P.F.I. increased 22 points or 25 per cent.

CONCLUSIONS

1. The data are too meagre to warrant any sweeping conclusions. Rather has the author attempted to set up a method of investigation which ought to yield significant disclosures when applied to several hundred cases.

2. The known close relation between exercise and improvement of fitness suggests that boys classified as active, who lost in P.F.I. were (*a*) wrongly classified, or (*b*) over-strained by summer activities, or (*c*) have some hidden defect. In any case, they should be interviewed again to determine the real reason for apparent declines in fitness.

3. Loafing during an entire summer is inexcusable in growing boys who are organically normal. Parents of such boys ought to "take steps" either to put them to work or discover the inner reasons for their physical inaction.

4. Many forms of light work are but little better than loafing. Caddying, for example, when it means but a round or two a day, is likely to involve other practices prejudicial to health.

5. Apparently a combination of work and play or camping yields the best results in health improvement.

6. Camping and other forms of active freedom are beneficial. But camping is not superior to other forms of active summer living *unless the camp director incorporates in his program a regular and repeated testing procedure with modifications of individual programs to meet each boy's needs.*

7. From the health standpoint, all work and no play is as good as all play and no work, and far better than light work or loafing.

8. At least a fourth of the boys tested were stimulated by test results and succeeding conferences with the director of physical education to improve their physical fitness during the summer.

Measurement of Physical Fitness at Camp Brooklyn

By J. Wayne Wrightstone

SINCE the beginning of the present century, the growth of the organized summer camp has been phenomenal, and for several reasons. Cities increased in population, and the trend of urbanization caused a curtailment of adequate areas in which the youth of the city could play. The streets became congested with traffic, vacant lots decreased in number, industry ceased to absorb its usual quota of youth; so schools, parks, and recreation centers became over-crowded. The city parents' problem was to find a suitable place for children to grow in summer without jeopardy. The organized camp helped to solve the problem.

In his popular *Handbook,* Porter Sargent writes that "Camp directors are moved by a common purpose: to give to the young people in their charge a summer of happy, wholesome, out-of-door activity to the end that their bodies, minds, and characters—*especially their bodies*—shall be stronger in the fall."[1] Dimock and Hendry used part of a "Summer Camp Test," which is regularly employed at Camp Ahmek, to find out what the boys themselves considered the most valuable acquisition from a summer spent in camp. These investigators found that boys considered "Better health, physical fitness, posture, etc." as one of the three most valuable acquisitions.[2]

Practically all camp directors mention in their camp literature the fact that a season in camp greatly improves the camper's health, but the directors usually make no attempt to substantiate such statements with definite proof. In the early days of the summer camp movement, the mere fact that the child appeared healthier after his sojourn in camp was the only health measurement employed. But as the number of camps increase, and their organization becomes more thorough, both parents and directors are requiring more definite proof that the summer camp improves the child's physical fitness.

It is curious that the chief measure used to "prove" the health values of camping is increase in weight. Of course the plain fact is that many children greatly need to lose rather than gain in weight. Malling-

---

[1] Porter Sargent. *A Handbook of Summer Camps,* 8th Ed., p. 16.

[2] Dimock and Hendry. *Camping and Character,* pp. 17, 18. New York: Association Press, 1929.

Hansen[3] has adequately shown that adolescent boys and girls have three periods of normal growth annually—and particularly that in the summer period there is a great gain in height *coupled with a loss of part of the weight gained in the spring period!* Evidently directors of camps who rely on weight increases as measures of gain in health are misleading many parents, as well as themselves. But this only emphasizes further the need of a truly valid measure of physical fitness, to reassure parents, to improve camp programs, and to determine the effectiveness of routines and personnel. This report concerns itself chiefly with such a measure.

CAMP BROOKLYN'S HEALTH PROGRAM

In an attempt to furnish proof of improvement, the camp directors of Camp Brooklyn instituted in 1934 a set of comparative physical examinations. A few days after the boys arrived in camp they received their first examination; and a few days before they departed they received their second. In former years the camp nurses and camp physician, a medical student, made a more or less casual examination of each boy's heart, lungs, blood pressure, skin, etc. Any serious deviation from the normal was recorded. In an attempt to determine if the summer had improved the boys' physical fitness, the findings of the two examinations were compared.

These traditional health examinations and comparisons, though considerably more valid than weight measures, proved practically nothing; for the physician's examinations, besides being casual, were of necessity highly subjective. Mere "yes" and "no" records or check marks to indicate the presence or absence of serious defects provided almost no basis for accurate comparisons.

To furnish more definite proof of improvement in the camper's health, camp directors selected the "Physical Fitness Index" tests, which are highly objective, as well as reliable and valid measures of health and physical condition. By giving these tests to the boys at the beginning and again at the end of the season, definite indices could be secured which would show whether the sojourn in camp improved or impaired the boys' health.

When a boy arrived at Camp Brooklyn during the season of 1934, he was given a medical examination for heart, lung, skin, and hernia condition. If the boy's physical condition warranted his taking the "Physcial Fitness Index" test, the use and purpose of the test was explained to him, and he then proceeded to go through the seven physical capacity tests. Measurements were taken with care, and the whole test was conducted with the necessary vigilance.

After the boys underwent these various initial tests of physical fit-

[3] Malling-Hansen, *Perioden im Gewicht der Kinder und in der Sonnenwärme*, Kopenhagen, 1886.

ness, the scores of which were properly recorded, they were privileged to engage in the many activities which Camp Brooklyn offered. The aim of the camp was to teach that sports are not ends in themselves, but means towards ends: namely, health, pleasure, self-control, and character.

Field Sports.—The camp had two main sections, junior and senior. The junior section comprised boys from nine to fourteen years of age; the senior section, boys from fourteen to eighteen years of age. Each section had its own program of group and individual field sports. Contests were held in baseball, volleyball, track, swimming, basketball, tennis, boxing, wrestling, and touch football. A hiking club was formed in addition to the usual over-night hikes and three-day canoe trips.

Water Sports.—The junior and senior sections used the facilities of the waterfront extensively. In addition to regular daily mass swimming periods, instruction was offered in boating, canoeing, diving, recreational swimming, advanced swimming, sailing, life-saving, and water games.

Medical Care.—Adequate precautions were exercised to protect the campers' health by proper sanitary measures and frequent inspections. Incoming food was inspected, drinking and washing water were analyzed, and sewage disposal supervised. Cabins were inspected daily, and the personal cleanliness of campers was checked. Colds, fatigue, and similar dangers were quickly detected and cared for at the infirmary. Special illness was diagnosed and treated by a licensed physician.

PRESENTATION OF DATA

Because of late arrivals or early departures, usable data were secured for only fifty campers. The initial tests were administered during the first week at the camp, and the final tests during the last week. No other testing was possible because the testing apparatus was rented for only the first and last weeks of the camp season. The camp season was nine weeks in length.

Certain uncontrollable factors influenced the Physical Fitness Indices which were obtained. First, some of the boys had caught colds shortly before the administrations of the final tests. For almost two weeks rainy and inclement weather not only caused some boys to catch colds, but enforced indoor instead of outdoor physical activities on all. Second, the final week's unusual program of fairs, carnivals, the season's banquets and final campfires may have affected the physical energy and strength of the campers. Third, the spirometer used for the final testing of lung capacity seemed by all empirical tests to measure consistently under the capacity indicated by the spirometer for the initial test. This decrease was laid to some systematic error in the measuring instrument. The indices have been computed without any attempt to correct this error. All of these uncontrollable factors have served to

reduce calculated increases in Physical Fitness Indices, but despite these hindances a creditable gain in physical fitness is indicated for the camp season.

Though data were obtained for only fifty campers, the figures available are sufficiently indicative of the trends in physical fitness to be of value in the interpretation of results of the health program at Camp Brooklyn. Figure 1 gives the distribution of the P.F.I.'s of fifty campers on initial and final tests, and a graphic representation of the cumulative frequency curves.

Physical Fitness Indexes	*Initial Test*	*Final Test*
120–130	0	3
110–120	6	8
100–110	11	11
90–100	10	10
80– 90	10	8
70– 80	9	8
60– 70	2	1
50– 60	2	1

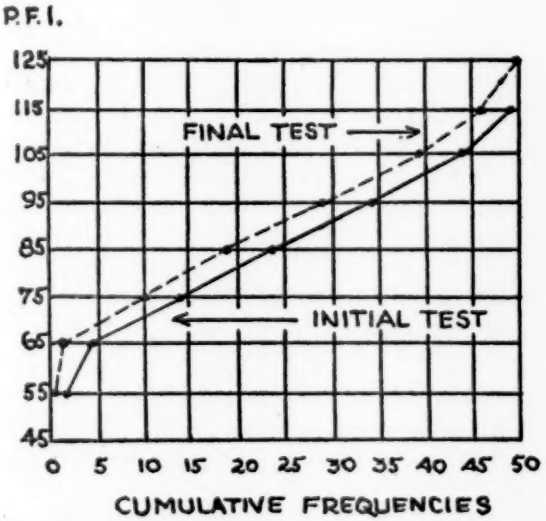


FIG. 1.—Cumulative frequency curves of physical fitness indices on initial and final tests, indicating consistent gains of campers in an eight-week period.

An inspection of Figure 1 will indicate that there was a gradual shifting of frequencies from the lower indices to indices a step or two higher. In step 120-130, for example, no camper attained that high an index on the initial test. Three campers, however, attained an index in this step on the final test. A detailed comparison of average indices for 50 campers at the beginning as compared with the end of the camp season is presented in Table I. The graphic representation is depicted in Figure 2.

TABLE I

AVERAGE GAINS OF FIFTY CAMPERS ON PHYSICAL FITNESS TESTS ADMINISTERED AT THE BEGINNING AND END OF THE CAMP SEASON

Physical Fitness Tests	Campers	Average P.F.I. on the Test	Standard Deviation	Difference of Averages	P. E. of Difference	Ratio
Initial Test	50	90.52	16.20	6.50	1.16	5.3
Final Test	50	97.02	15.55			

The average index which 50 boys had when they were given the initial test at Camp Brooklyn was 90.52. This index is almost 10 points below the normal index of 100.[4] The interesting finding, however, is that the average index which these same boys attained on the final test at the end of the camp season was 97.02. While this index is about 3 points below the normal index of 100, it represents an average gain during the camp season of 6.5 points per season camper. The probable error of the gain is 1.16, and the ratio of the gain to its probable error is 5.3. The gain, therefore, is demonstrated to be reasonably reliable and significant evidence of the efficiency of the camp's health program for increasing physical fitness. The gain would probably have been greater if the related factors of colds, unusual final programs, and possible defective registering of the spirometer scores might have been controlled.

On the other hand, twenty out of fifty boys given both tests lost in P.F.I. during the eight weeks elapsing between tests, their median loss being eight points. These losses represent real problems in camp management which more frequent tests would have discovered.[5] A more effective adaptation of activities to individual needs would eliminate most of these losses and thereby greatly raise the camp average gain in physical fitness—and therefore the pleasure of campers and the success of programs to improve social efficiency.

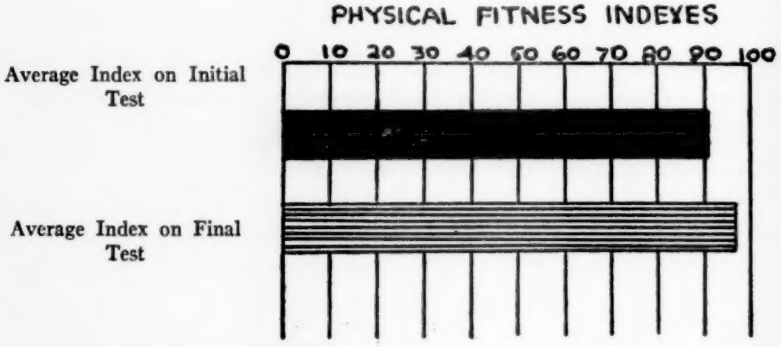


FIG. 2.—Average physical fitness indices on initial and final tests, including average gain for campers in an eight-week period.

IMPLICATIONS OF THE FINDINGS

Several implications seem evident in the findings of this initial study of physical fitness among the season campers at Camp Brooklyn. ***First,*** the camp program of field sports, water sports, sanitation, and

[4] These relatively low averages are at least partly due to the relative inexperience of testers. (*Ed.*)

[5] See John Malcolm's results when bi-weekly tests were given. Page 166.

first-aid does definitely contribute to the building of physical strength and prowess. *Second,* the Physical Fitness Index may be used as a guide for a detailed analytic, diagnostic, and remedial program for counseling with individual campers. ***Third,*** the objective evidence supplied by the physical fitness tests is far more trustworthy and reliable than subjective evidence usually adduced from casual medical examinations.

Not only should the results of objective physical fitness tests be used for the reconstruction of the individual camper's programs and activities, but also the *camp's* program and activities. These two are inseparable parts of a total picture, and changes in campers' conditions and needs must be accompanied by corresponding changes in the camp curriculum.

The results of the physical fitness tests were also employed this year in the following ways: in group competition in baseball, basketball, and track, teams were equalized in such ways that the total Strength Indices of competing teams were approximately the same. A beginning was made in the use of the P.F.I. as a diagnostic instrument for counseling and building remedial programs for individual campers. The results were used mainly, however, to provide an objective survey of the health program of the camp.

PROPOSED USES FOR NEXT YEAR

Next year it is hoped that testing equipment will be in the camp continuously for the entire season. This will permit weekly or bi-weekly testing of the campers. Then the indices might be used as follows:

1. To equalize teams for competitive sports.
2. To assign to physicians for more careful diagnosis all low P.F.I.'s.
3. To reconstruct continually camp health and physical education programs to group and individual needs of campers as revealed by P.F.I.'s.
4. To send a simple explanatory report of each camper's P.F.I. and his program to his parents as often as possible.
5. To survey the efficacy of the camp's comprehensive health program.

Thus, the measurement of physical fitness at Camp Brooklyn will become an integral and functional part of creative health and camping. The camp program will be adjusted to the boys' interests and needs and the boys will participate in determining the policies and practices of camp health and physical education.

A Program of Measurement in Health for Boy Scout Summer Camps*

By James A. Wylie

EVER since the first summer camp for boys was organized by Ernest Balch, in 1881, the objective *health* has held an important position in the reasons for sending boys to camp during the summer months.

There is no doubt about the importance of this objective, for we find everyone concerned with camp—the boys, their parents, and the directors themselves—mentioning health benefits as possible outcomes of a stay at a summer camp.

Specifically, the challenging statements of J. Edward Sanders and John Dewey prompted this study.

J. E. Sanders observed:

"There has been a tendency to assume among both parents and camp leaders that the mere fact that a child is in camp is proof sufficient that his health is being benefited, his physical stamina and vitality increased."[1]

John Dewey's challenge is more definite:

"To profess to have an aim and then neglect the means of execution is self-delusion of the most dangerous sort. When we take ends without means, we degenerate into sentimentalism. In the ideal we fall back upon merely luck and chance and magic or exhortation and preaching." [2]

These two statements, when applied to the problem, leave in our minds the questions, "Are we improving the health of the campers? If so, how much? If not, why not?"

During the summer of 1932, therefore, the writer endeavored to discover just what was being done in the light of this objective, at Camp Waubeeka, operated by Bronx Valley Council, Boy Scouts of America.

Up to this time our only measure of health had been a physician's examinations at the beginning and at the end of the boys' stay at camp. His estimates of improvement or decline were data from examinations of the heart, lungs, blood pressure, skin, hernia, etc.—the usual medical inspection. Any deviation from the normal was noted. This done, the camp doctor then usually forgot all about the boy for the remainder of his stay at camp until the leaving examination, except for an occasional treatment for sunburn, cuts, etc.

---

* This report is a summary of the writer's Master's Thesis, on file in the Boston University School of Education Library.

[1] J. E. Sanders, *Safety and Health in Organized Summer Camps*, p. 80.

[2] John Dewey. The source of this characteristic statement has been temporarily lost.

The findings of the two examinations were then compared to discover what improvement in health had resulted. Naturally, the type of examination conducted made it very difficult, if not impossible, to discover any changes in the individual. Naturally, the boy, because of his environment and activity, would have many more cuts, scratches, bruises, etc., than when he first came to camp. If the camp doctor were to consider such data, then he would undoubtedly be inclined to estimate that the boy was now in poorer health than when he arrived. But is this necessarily so?

The bare statement of this haphazard method of measuring health reveals its inefficiency. It seems to be hardly more accurate than mere guessing. In the light of our professed objectives it seems a most serious deficiency of summer camps. A change in testing technique was indicated as a first prerequisite to any reliable approach to the problem of effecting or determining improvements in physical fitness in our camp.

THE TESTS AND PROCEDURES

1. In approaching the problem of measurement in health in summer camps for boys the first step was the selection of a valid and reliable measure of health. By good health we mean, unless otherwise stated:

"That condition of any living organism, including its parts and functions, which conduces to the greatest amount and highest quality of purposeful activity."[3]

The term *physical fitness* is meant to be synonymous with physical health.

2. After canvassing the field of tests we discovered that the only test of established validity, reliability, objectivity, and possessing an adequate set of norms, was the Physical Fitness Test from which is derived the "P.F.I."

3. This composite test was given to 140 campers on the day they arrived in camp and again on the day they left camp. The difference between the two scores was accepted as a significant measure of change in the health of campers during the intervening period.

4. In an effort to determine the reasons for P.F.I. changes, a record was kept, of (*a*) campers' participation in activities and (*b*) any accidents and injuries they may have suffered. A questionnaire was later sent to boys and parents to discover, if possible, just what were the boys' emotional attitudes and reactions to the camp. These questionnaire replies were used to supplement the material collected during the summer.

5. A survey, too extensive to bring into this brief article, showed that the camp directors had carefully considered the chief factors affecting health. Particularly had provision been made for a healthful en-

[3] Frederick Rand Rogers, *Fundamental Administrative Measures in Physical Education*, p. 28. Newton, Mass.: The Pleiades Co.

vironment, excellent program, and the best possible leadership obtainable.

PRIMARY RESULTS

The results, in brief, of the summer's program as revealed by P.F.I.'s were, of 140 boys tested,

1. One hundred and five boys increased their scores, showing that they had had an increase in physical fitness—or "capacity for physical activity"—as a result of their stay at camp.

2. Forty-one boys, of the above, increased their scores from below normal to normal and above.

3. Thirty-one boys declined in physical fitness.

a) The losses of twenty-one boys were so small as to be considered insignificant and in no way detrimental.

b) Ten boys had losses in health which were classified as detrimental.

4. Median P.F.I. gains were from 106 to 114—an average of 8 per cent.

Thus, even the most cursory analysis of results is startling, for it reveals that, while great average gains may be made, our health claim is not valid for many individuals, for at least 20 per cent of the boys actually declined during their stays of from two to six weeks.

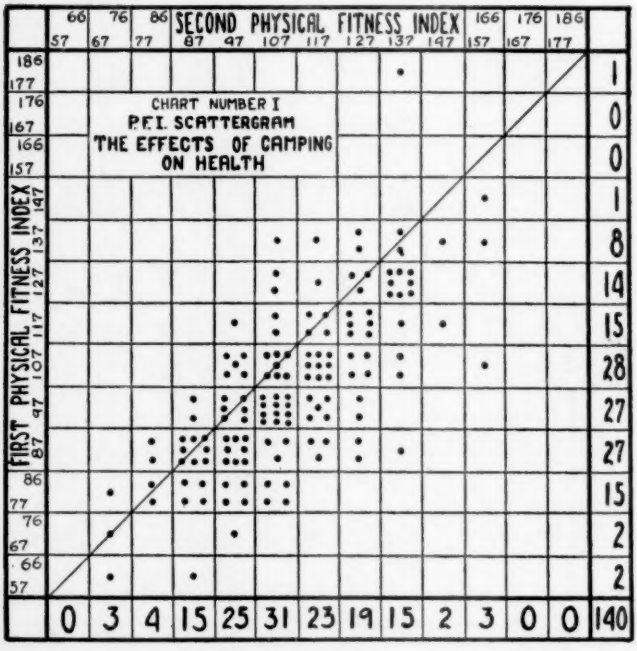


CHART I
P.F.I. Scattergram: The Effects of Camping on Health

There are many possible causes for these losses. For the subjects studied, however, there were two outstanding causes of loss of fitness which were revealed by observation during the camping period and subsequent inquiries among boys and parents.

The first of these causes of declining fitness playing a part in the camp studied was the mental attitude of some of the boys towards camp and its entire program. A typical example is the report below which shows just how a poor mental attitude towards camp caused a loss in bodily health.

Case No. 1

A— H—, 11 years, 9 months old. His first P.F.I. was 104. At the end of his stay at camp, his P.F.I. was 99.

This was A's first stay away from home. After being at camp for two weeks his mother decided that he should return home. However, the father insisted that the boy remain in camp. At the end of the first month the father again insisted that the boy remain in camp because he had "signed up" for the entire summer. At this time, the boy's score had decreased to 103. During the following period A— became so determined to go home that at the end of the sixth week his father finally agreed to his son's request. By this time his P.F.I. had decreased to 99.[4]

This is but one of five examples indicating that the mental attitude of a boy regarding home and camp was a dominant factor in the maintenance and development of health.

EFFECTS OF INFECTIONS AND ILLNESSES

It is reasonable to assume that the fitness of campers is influenced to a large extent by the way the camp treats illnesses and injuries. But objective evidence is better than conjecture. Therefore, a special study was made to determine the effects of illnesses and injuries on campers' P.F.I.'s.

The camp studied had an excellent record, when considered in the light of absence from illnesses and injuries. Only those cases which were serious enough to come to the attention of the camp doctor are mentioned here.

The following table shows the relation between accidents and illnesses on the physical fitness of those who were injured or ill.

The average increase in P.F.I.'s for the entire camp for the complete season was eight points.[5] It is interesting to note that for only three ailments did we find a decrease below that of the average increase. This suggests that the health of campers is not seriously affected, as a rule, by minor illnesses or injury. In fact, all cases, by average, have shown some increase and no definite loss.

---

[4] This case report indicates the high reliability of the P.F.I. when tests are given by skilled testers. (Ed.)

[5] This was almost identical with that for Camp Brooklyn. (See page 150.) However, the latter camp held all its boys for nine weeks, while many at Camp Waubeeka remained only two weeks.

EFFECTS OF CURTAILED EXERCISE

In the survey of the health of the boys we reported that ten boys had decreases in health that were sufficient to be classified as "detrimental." Investigation reveals that the reason for fitness declines for five of these boys was improper mental attitude. *It is interesting to discover, however, that of the five remaining cases of serious loss of health four have been traced directly to lack of sufficient exercise.*

TABLE I

Illness or Injury	Number of Cases	Average P.F.I. Increase of Those Having the Ailment
Colds	25	9.0
Sore Throats	21	8.0
Cuts	17	5.4
Ringworm	14	12.0
Sprains, strains, bruises	14	17.0
Nausea	9	.8
Infected Wounds	9	6.5
Poison Ivy	5	10.0

To illustrate this point the following case will suffice:

A— G—, fifteen years and four months old. His first P.F.I. was ninety-six and his second was eighty-six. A— G— was not a very "social" boy. He was greatly interested in nature work. He would go off by himself for hours and listen to the birds, collect flowers, leaves, and plants.

During his two weeks' stay at camp he went swimming only eight times. He did not go on any of the special trips, such as the three-day hikes and canoe trips. He entered no swimming meets or athletic events. Whenever a team game was in progress he would be off some place so that he could not be reached or asked to participate.

These mental attitudes and interests prevented him from getting sufficient exercise to build him up physically. Hence it was natural that he should lose in physical fitness. The extent to which he lost is fairly accurately represented by the difference between his P.F.I. scores. The loss was about 11 per cent.

It was impossible for us to discover just exactly why the tenth boy lost in health. All our observations and testing failed to reveal a logical reason. Perhaps if the boy had been under our care for a longer period of time, we might have been able to discover just what the cause was. He remained at camp only two weeks.

THE VALUES OF SPECIFIC ACTIVITIES

There are bound to be differences in the values of various activities as developers of "health," or "physical fitness" or "capacity for abundant living." Any analysis of specific activities will show that although all have common elements, they differ in many ways. Some activities

require more skill, some more endurance, some more courage, some more native ability.

An analysis of the Camp Waubeeka program reveals that according to the measurements used and the methods followed at this camp for this year the various activities should be rated, in general, and tentatively, for their contribution to development of health, about as follows:

1. General canoeing
2. Speed swimming
3. Life-saving
4. Canoe trips (four days)
5. Basketball
6. Track
7. Three-day hikes
8. Touch football
9. Volleyball
10. Soccer

Other activities rated so low in improvement of fitness that they were not included in the list. When the above list is examined, it will be discovered that those events which seem to include all functions and conditions which promote *and require the greatest amount of practice and effort* are those that rate the highest in the development of health.

Table II shows the sports mentioned by boys as the ones they played most during their stay in camp. The Table shows whether they lost, remained constant, or gained in health, the percentage who gained, and the average gain in physical fitness, as shown by the physical fitness index.

TABLE II

Sport	P.F.I. Change		Total Cases	Per Cent Gaining	Average P.F.I. Gain
	Loss	Gains			
Track	0	10	10	100	14.1
Basketball	3	17	20	85	11.5
Baseball	5	31	36	86	11.0
Swimming	5	37	42	88	10.3
Hiking	1	5	6	83	9.6
Touch Football .	1	11	12	91	8.4
Volleyball	6	28	34	82	7.0
Soccer	5	14	19	73	6.0
Quoits	0	6	6	100	5.1

The conclusions suggested by the above data are that as individual sports, track, basketball, baseball, and swimming were, for the boys studied, most effective in the development of health.

CORRELATION BETWEEN GAIN IN WEIGHT AND IMPROVEMENT IN HEALTH

Many camps state somewhere in their catalogue something of this sort—"Our boys gained a total of 187 pounds during the last camping season."

What does this mean? Does it mean that a boy who gains five or ten pounds, perhaps mostly in fat, is more healthy than the boy who has

been very active and has remained constant or even lost slightly in weight? As is apparent to the most casual observer, often a loss of weight is to be desired![6]

The scattergram, Chart II, compiled from the results of the tests conducted at the camp investigated shows a negative correlation. The *r* is —.043.

There are cases of gain in weight and gain in physical fitness, gain in weight and loss in physical fitness, loss in weight and loss in physical fitness, loss in weight and gain in physical fitness, and constancy in weight and gain and loss in physical fitness! Thus, the gain-in-weight measure of health or the P.F.I. measure (or both) is improper as a measure of "health improvement for boys during summer camp." But the American Child Health Association has already demonstrated the invalidity of weight-height indices; Malling-Hansen has shown that it is normal for many children to lose during summer months, and simple observation suffices in many cases to support this contention. On the other hand, the P.F.I. has been adequately and repeatedly proved to be a very highly valid measure of general health.[7]

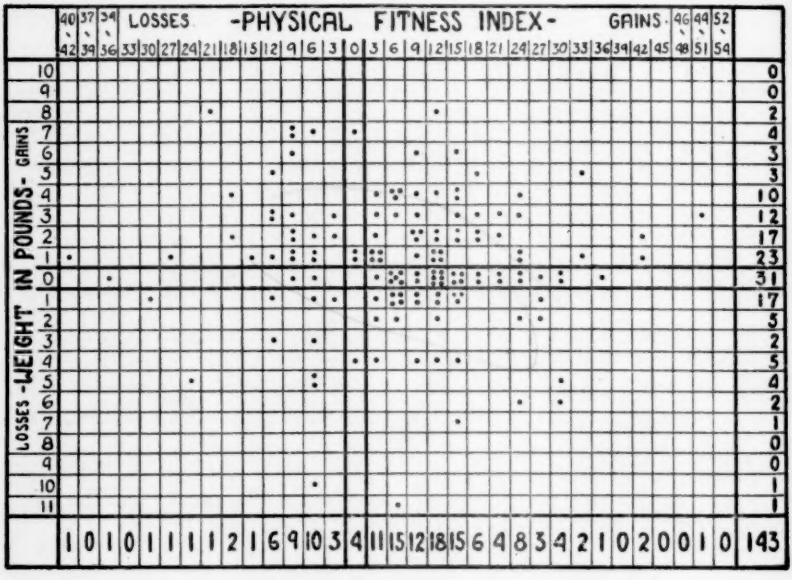


CHART II

Scattergram: The Correlation between Change in Weight and Change in Physical Fitness—Summer, 1932

[6] See also the comment and note on page 144.

[7] See particularly Chapters X and XI of Rogers' *Fundamental Administrative Measures in Physical Education.*

From our observation, the value of gain in weight *over a long period of time* is to show that growth is present. Not that increase in the size of skeleton and muscles is *necessary* for health, for it is not, but that, generally speaking, growth is "one of the signs of health in children."

Hence the conclusion is indicated, as a result of the investigation in the camp studied, that there is no reason to believe that gain in weight *per se* has any significance as a measure of health improvement at summer camps.

THE OPTIMAL PERIOD OF STAY AT CAMP FOR OPTIMAL HEALTH DEVELOPMENT

J. Edward Sanders in his investigation regarding the length of stay at camp and the effect it had on health says: ". . . *the data indicated that the longer children remained in camp, the more likely they were to become ill.*"[8]

If Sanders' findings, in the investigation he made of 114 camps, are indicative of the conditions in most camps, then the summer camp has lost claim to one of its greatest values.

However, it is important to recall that Sanders apparently defines health as absence of disease, illness, and injury. It is significant that he gave no positive definition of health in his survey. Nor did he have access to objective or normed test reports.

The chief interest in our study was in the development of health in our own camp. The following table shows the average gain in physical fitness on both the second and first tests along with the length of stay at camp.

TABLE III

THE EFFECTS OF LENGTH OF STAY IN CAMP ON P.F.I.

Length of Stay	First P.F.I. Test Average	Second P.F.I. Test Average	Average Change in P.F.I.	Per Cent Change in P.F.I.
Two weeks	108	113	+ 5	5
Three weeks	108	121	+ 13	12
Four weeks	110	116	+ 6	5
Six weeks	109	123	+ 13	12
Eight weeks	95	115	+ 20	21

These data indicate that campers who remained eight weeks at camp had the greatest improvement in health, as shown by the Physical Fitness Index.[9] However, it is significant that the eight-week campers who gained most had the lowest beginning P.F.I.'s. This condition agrees with that found by others, and reduces somewhat the implied claims that camp routine improves health more than does remaining at home.

[8] J. Edward Sanders, *Safety and Health in Organized Summer Camps*, p. 13.

[9] See also Malcolm's analysis on page 166.

CONCLUSIONS

1. Substantial health gains were made during a period of stay in the camp studied. One hundred and five boys made definite gains in physical fitness as determined by P.F.I. tests. This means that they gained in muscular powers more than average boys would gain during similar periods of time and with similar gains or losses in weight.

2. The program presented did not fit the individual needs of all the boys, for thirty-one boys lost in health. Ten of these losses were serious. Twenty-one were insignificant.

3. Those boys whose exercise habits were below average showed very small increases in fitness or lost very definitely in health.

4. Long hikes and canoe trips had a beneficial rather than a detrimental effect on health.

5. There seems, as a result of this study, in this particular camp, to be no correlation between gain in weight and improvement in health for boys in summer camps, and therefore that *the use of weight gains to "prove" the value of any summer program for adolescent boys is misleading to parents.*

6. The eight-week stay in this study proved to be most beneficial to campers.

7. Merely living in a rural environment does not in itself guarantee improvement in health.

8. Programs of activity should be arranged and controlled to meet the physical needs and limitations of the campers participating. Special adjustments to individual needs are essential to a proper program.

9. Enjoyment of what one does plays a very important part in the development of health. *It is worse than futile, at least from the standpoint of health development, to force homesick boys, or boys who are otherwise unhappy in camp life, to remain.*

10. Sore throats, colds, cuts, infected wounds, etc., apparently did not greatly retard the development of health at the camp studied.

11. The conclusions reached above are findings for the camp studied, and for the particular program and year during which the study was made. Nevertheless, there is little doubt in the writer's mind that they may be duplicated at many other camps throughout the country, whether conducted by Boy Scout, Y.M.C.A., or other organizations.

12. This leads us to conclude that if activity programs of camps were built around the findings of preliminary or first P.F.I. tests, then camp directors would be able to prescribe specific amounts of intensive activity which would fit the individual needs of campers far more effectively than they do now.

13. Once we determine needs by objective tests, and then meet these individual needs and measure results, we can safely state that we are

improving the health of the campers in our charge. Then, and only then, our claim of health development will be valid.

PLANS FOR THE 1935 CAMPING SEASON

The findings summarized in this report (which was prepared in 1932) have been substantiated by similar findings during the years of 1933 and 1934 at Camp Waubeeka. These verifications increase our assurance of their validity to such an extent that we now base our entire health program on P.F.I. tests supplemented by camp physicians' recommendations.

During the 1935 season we plan to:

1. Test all campers every two weeks. This will enable us to check our own progress for the preceding two weeks and allow for more effective adjustments of our program to the individual camper.

2. Give to the ten most needy campers the very best individual attention, placing them in the hands of an experienced man who will be in complete charge of developing them physically with the aid of medical advice. For these boys the entire morning will be set aside for physical development under these two men.

3. Improve and emphasize those particular activities that have the greatest value in developing the physical fitness of the campers.

4. Experiment with those activities which have been reported as low in value, to determine, if possible, whether one can improve in some way their value to the program or eliminate them from our program to make more room for the more valuable activities.

Meeting Individual Health Needs in a Y.M.C.A. Boys' Camp

By John Baden Malcolm

INTRODUCTION

SEVEN years of directing boys' camps have convinced the writer that the primary objective of parents in sending their offspring to camp is that the boys may develop strong, healthy bodies and build up a store of resistance against the cold, diseases, and indoor life of winter months. In this conclusion such authorities on camping as Sargent, Gibson, Dimock, and Hendry[1] concur. All other parental interests and purposes are subservient to this one.

Inasmuch as the greatest concern of parents is the health of their boys, camp programs should be conducted to produce the greatest amount of physical fitness within reason for each boy. Moreover, since it would be absurd to assume that just because a boy is in camp his health is being benefited, two of the camp director's chief functions are to discover, by valid and reliable means, whether the program determined upon for each camper fulfills these objectives; and to make such changes, from week to week, as each boy's changing condition requires.

This study reports the results of a fairly thoroughgoing attempt to determine each boy's physical condition and needs, and to adapt the program to these needs in a typical Y.M.C.A. camp during the summer of 1934.

As contrasted with programs during previous years at this and other camps, the new adjustments reported hereafter were most gratifyingly successful. They not only made it possible to improve each boy's physical powers greatly (which could not have been accomplished under the old non-testing and unimaginative method of treating all nearly alike) —but they also greatly increased the staff *esprit de corps,* reduced camp disciplinary problems almost to the vanishing point, and greatly increased the boys' enjoyment of camp activities. But perhaps most significant of all, the interest and approval of parents in the camp, its management, and its values were multiplied several fold. This is best proved by objective measurement: parents who came to take their boys home left them for two, four, even six weeks more. *The director estimates "conservatively" that boy-weeks at camp were increased approx-*

[1] Porter Sargent, *A Handbook of Summer Camps,* 8th Edition, page 16; H. W. Gibson, "Administrative Problems," *Monthly Library on Camping,* Vol. IX, page 45, 1927; Dimock and Hendry, *Camping and Character,* Chapter II, page 19, 1931.

imately 30 per cent by the new testing and individual-needs and equality-between-teams programs.

The reader should remember throughout his reading of this report that the stressing of social adjustments, the development of skills, and the improvement of character need not be neglected in camp programs which are directed primarily towards health improvement. Nor were they neglected at this camp. In fact, these phases of camp life are enhanced by this procedure. Critical observation of problem cases has led the writer to conclude that boys are almost automatically better adjusted socially if they are improved physically. As Luther Burbank observed, "The healthy child has a thousand times the opportunities and the possibilities of a sickly one." The staff at the camp under discussion made excellent uses of these opportunities to develop social character.

The study reported below was conducted at Camp Ousamequin, one of the boys' camps of the Boston Y.M.C.A. The boys attending this camp are a representative cross-section of society. The P.F.I. Test was chosen as the chief instrument of measurement because of its proved validity, reliability, and objectivity, and because it provides two measurements which serve two very different purposes. The P.F.I. aids in determining health status, needs, and progress; the S.I. measures athletic abilities, and thereby makes possible the equalization of opposing teams and, therefore, the promotion of good social attitudes—"social efficiency." Both of these were used constantly throughout the eight weeks' camping season.

THE PROGRAM

This camp follows the familiar Y.M.C.A. or Boy Scout program of two-week camping periods. Boys arrive at regular intervals throughout the summer, are cared for by a permanent staff, and leave after stays of two weeks at the least, or some multiple of two weeks.

During 1934, upon arrival in camp, each boy was given a medical examination, which was followed the next morning by the physical fitness tests. This procedure enabled every boy to have a night's sleep so that the journey to camp would not affect his first test. Succeeding tests were given at the same time of day and under similar conditions. The same apparatus was used throughout the summer, and the same counselors handled the same pieces of apparatus for each test.

All boys having a P.F.I. of 90 or above entered into the regular camp program. Boys whose P.F.I.'s were below 90 were re-examined by the camp physician and interviewed by the camp director to determine the predisposing cause or causes for their low scores.[2]

[2] In view of the skepticism of inexperienced critics concerning the attitudes of physicians towards P.F.I. tests, it is significant to note that in practically every case known to those who use P.F.I. tests, the consulting and supervising physicians have become enthusiastic supporters both of testing and of subsequent adjustments to meet individual health needs. This is particularly true of physicians at summer camps.

A "prescription," or program, was then written for each boy in terms of exercise, rest, food, sleep, contacts with other boys, hobbies, and other interests. This prescription was prepared by the camp director, camp physician, and counselor involved. All members of the camp staff were then informed of their parts in the administration of these prescriptions so that the effort to improve the physical conditions of the boys was an organized one. Some boys were given mid-morning and mid-afternoon lunches with moderate exercise; others were placed with counselors able to control their eating habits, and heavy exercise was advised; still others, especially the younger boys with low P.F.I.'s, played games and tournaments during the cool mornings almost exclusively, and did their handicraft and shop work during the warm afternoons.

Two weeks later the boys were again tested. If they remained for two, three, or four two-week periods, they were tested at the end of each period, and P.F.I.'s were calculated. These scores provided an excellent check on the program for each boy, as they showed the amount of his gain or loss in true "fitness for life activities" and indicated the need of further modification of his program.

Some critics experienced in P.F.I. testing were skeptical about this measurement program, believing that a two-week interval was too short for any significantly measurable change in fitness to take place. These critics usually tested their groups six to eight months apart and base their judgments on the slight gains made by most boys during the fall and winter school months. However, *this study definitely proves that under controlled conditions results can be obtained in a short space of time.*

THE RESULTS—ALL BOYS

The records obtained were analyzed, first, in terms of the number of two-week periods the boy remained in camp, and second in terms of calendar periods. In addition, the P.F.I.'s obtained by retesting forty-seven boys on December 29, 1934, were compared with the scores made by the same boys while they were in camp.

The testing program and subsequent reports thereon were enthusiastically received by parents since they were able themselves to compare the scores on their own boys' cards. Both the camp physician and the director were busy on visitors' days explaining the scores to interested parents. Often parents who called to take their boys home decided to let them remain for another period because of the gains shown by the tests. Of the sixty-five boys entering camp the first period, fifty remained for the second period, *which was thirty more than had originally planned to stay.*

Of 149 boys who were tested two or more times, only 16 showed any loss of fitness on leaving camp. Thirteen of these 16 boys remained in the camp only 2 weeks. Thus, they entered camp, were examined and

tested, stayed 2 weeks, were retested and went home: *they were gone before anything could be done to correct their losses.* The majority of these 13 boys lost in fitness because of a rapid gain in weight: they did not remain long enough to convert the fat into effective muscle tissue.[8] Inasmuch as most of them gained in Strength Index, their slight loss in Physical Fitness Index was of no real concern. Another 5 of the 149 did not gain or lose, their entering and departing scores remaining the same. Again it is interesting to note that 4 of these 5 boys remained in the camp for only two weeks.

Making no differentiation of results for different lengths of stay in camp, the median P.F.I. gain for all boys was 19.8 per cent. By calendar periods, the median gain was 8.28 P.F.I. points or 7.8 per cent for each 2-week period.

These results are remarkable, particularly when compared with those in camps where tests are given *only* at the beginning and end of camping periods. The differences reveal how much more may be accomplished by the more frequent tests and modifications of programs.

THE RESULTS—BY TWO-WEEK PERIODS

Further analyses by two-week periods reveal much of interest and significance. Tables I and II provide data which indicate the superior values of longer periods of stay at camp.

TABLE I
MEDIAN P.F.I. SCORES

Number of Boys Tested	Length of Stay	Entering Median P.F.I.	Departing Median P.F.I.	Median P.F.I. Gain	Median % Gain
80	2 weeks	102.50	109.00	6.50	6.
28	4 weeks	104.00	125.70	21.70	20.9
12	6 weeks	89.00	116.67	27.67	31.
22	8 weeks	92.50	123.00	30.50	33.

The most striking revelation of these data is that a two-weeks' stay at camp is of relatively little benefit. Boys will gain nearly four times as much in fitness by doubling their stay. It appears, too, that the last two weeks add little in terms of physical fitness, but it may be that desirable physical habits and social attitudes and ideals become fixed during this period.

That great gains may be made even in two weeks seems to be indi-

[8] The P.F.I. is a measure of "capacity for activity." Norms increase rapidly for increase in weight. If body weight increases without a corresponding increase in strength, the P.F.I. testing and calculation reveal that the increased weight is chiefly fatty tissue or even colonic residue. Therefore, a gain in weight alone is not desirable. Of course, it is also not inevitable. Most boys gained in weight during their first two weeks, but their gain in strength was proportionate or greater, which is wholly desirable.

cated by Table II, though the chances are great that the boy who increased his fitness by 47 per cent in two weeks either did not respond properly to the first test, or was in unusually poor condition of a temporary sort during the first day at camp.

The various shadowgraphs and scattergrams tell an eloquent story of the effects of added weeks on campers' health. These graphic records, perhaps the first of their kind relating to summer camps, establish progress standards for future camp programs at Ousamequin. The

TABLE II
GREATEST INDIVIDUAL GAINS AND LOSSES IN P.F.I.

Length of Stay	Entering P.F.I.	Departing P.F.I.	P.F.I. Gain or Loss	Per Cent Gain or Loss
2 weeks	68	100	+ 32	47%
4 weeks	90	150	+ 60	66⅔%
6 weeks	88	132	+ 44	50%
8 weeks	84	142	+ 58	69%
2 weeks	112	100	— 12	— 10.7%

shadowgraphs are of particular interest since they show progress of the middle 20 per cent of campers rather than averages for all.

The line drawings showing variations between tests of campers remaining four or more weeks effectively demonstrate the errors of assuming (*a*) that most campers improve in health; (*b*) that improvement is regular; or (*c*) that it is automatic. The variations as between individuals are especially striking. These records establish beyond reasonable question the necessity of frequent testing and individual programs if camp objectives are to be achieved in fact: if camp organizers and sponsors are to justify their claims.

THE RESULTS—BY CALENDAR PERIODS

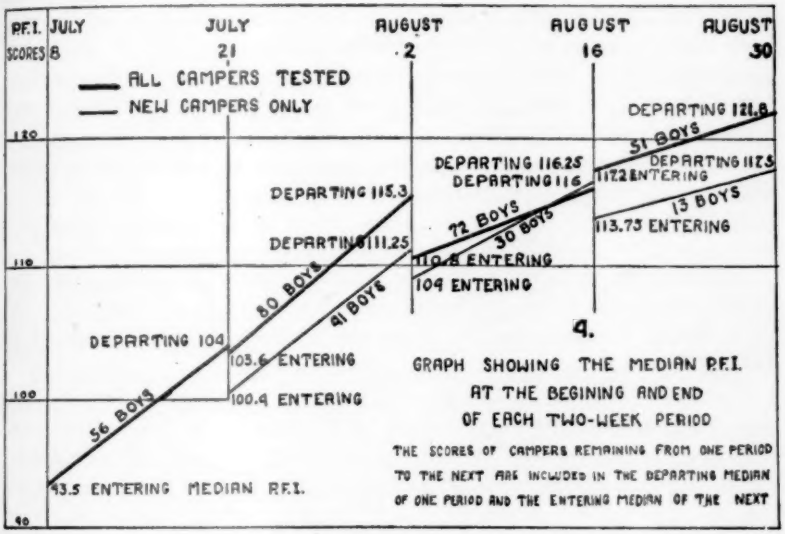
To seek a further explanation for the apparently numerous losses in P.F.I. by individual boys at the ends of certain periods, an analysis of P.F.I. changes was made according to calendar dates. We have previously considered the results solely on the basis of the *number of weeks* a boy remained in camp. If classified according to dates, might the data reveal either program deficiencies during certain periods or the effect of a spell of bad weather?

In this connection, see Graph 4. This graph shows how the median P.F.I. continued to rise throughout the eight weeks. These results seem to indicate that the program was about equally strong throughout the entire season.

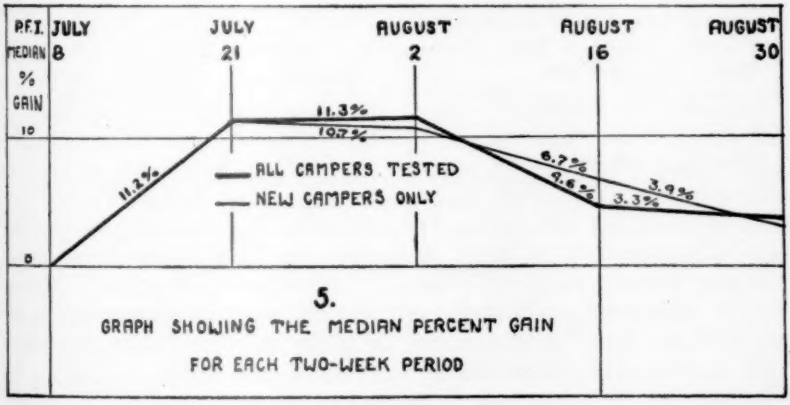
Another interesting fact is brought out on Graph 4, in comparing the scores of the new boys entering each period with those of all the boys tested at that time. It is surprising to note that the later in the

season the boys entered camp, the higher were their entering median P.F.I. scores. One might conclude from this that these boys had enjoyed programs fitted to their individual needs before coming to camp! Much research, however, will be necessary on this point before definite conclusions can be drawn.[4]

Graph 5 shows that the highest median per cent gain came at the end of the fourth week or in the middle of the camp season.



GRAPH 4



GRAPH 5

[4] For an investigation in a related field, see Arthur L. Jones' report, "The Effects of Various Summer Activities on Health." (Ed.).

The following reasons are advanced for the loss in the "median percentage of gain" beginning August 2:

1. Rain and cold weather from August 10 to August 16 interfered with the camp program and kept the boys indoors.

2. A let-down on the part of the camp staff occurred due to previous success.

3. The steady and great rise in the median P.F.I. from one period to the next made an increase in the median percentage of gain more difficult to achieve. This is also shown by the superior gain of the new boys over the boys who remained from previous periods. A somewhat involved analysis, too long to be detailed here, indicates that this loss began about July 28th, in which case the graph for the median percentage of gain would almost resemble a normal curve, showing that it is increasingly difficult to achieve a rapid gain beyond a certain point, which the writer places tentatively at 14 per cent.

TESTS MADE DECEMBER 29, 1934

To discover the effects of city life subsequent to camping on the Camp Ousamequin boys, forty-seven were retested on December 29, 1934 during a camp reunion. Note the surprising results reported in Table III.

Records of boys in schools, Y.M.C.A.'s, etc., reveal that, on the average, boys past twelve years old usually decline in P.F.I. from year to year, and particularly during the winter months. This is probably due to the lack of control of all phases of their lives such as are present

TABLE III

MEDIAN P.F.I. DEPARTING SCORES COMPARED WITH MEDIAN P.F.I. SCORES MADE DECEMBER 29, 1934

Number of Boys Tested	Length of Stay in Camp	Departing Median P.F.I.	12/29/34 Median P.F.I.	Median P.F.I. Gain	Median Per Cent Gain
27	2 weeks	107.5	113.13	5.6	5.2%
10	4 weeks	109.0	114.00	5.0	4.6%
10	8 weeks	124.0	124.00	..	....

in well-conducted camps, and the fact that the winter climate is not as health-stimulating as fairly warm weather. These forty-seven boys, however, do not, as a group, show any loss in their median P.F.I. scores.

The boys who remained in camp the shortest time gained the most in their median P.F.I. after they left. Of course, it would be harder—and inadvisable as well—for most of the eight-week boys to gain in the interim, since they had gained so much during the camp season. It is also important to remember that the eight-week boys were, in December, 10 per cent higher in physical fitness than the two-week boys, even though the latter had gained most. Thus, the relatively per-

manent effects of eight weeks camping (at this camp in 1934) were far more beneficial than shorter periods.

Since these boys come from all classes of homes and environments and attend many different schools, it would seem reasonably safe to suggest, subject to further investigation, that it has not been their program since leaving camp that has caused them to maintain during winter months their summer P.F.I.'s, as much as *the building-up process started in camp has carried over into the winter months.*

EQUALIZING TEAMS

The Strength Index was used to equalize teams for competition, instead of organizing teams on the basis of age, or as Juniors, Intermediates, and Seniors, as is often done. For example, the boys whose S.I.'s ranged from 500 to 749 competed in one league. Those with Indices from 750 to 999 competed in another league, etc. These divisions were also utilized for track meets, swimming meets, rowing races, and all individual competition. Heats were arranged so that boys of approximately the same strength competed against each other. Generally the camp was divided into six or eight classes for these competitive events.

Among many outstanding consequences of this program of equalizing competition, the following four are most significant:

1. At no time during the summer did a big boy—or any one boy—run away with the majority of the events, or did one team "clean up" a baseball, volleyball, or basketball league.

2. The boys were pleased, because they felt that they had equality of opportunity.

3. The athletic and swimming counselors were pleased because they had an objective means of arranging their classifications and no guess work when it came to arranging heats.

4. Arguments were eliminated.

5. The boys gained noticeably in social efficiency or citizenship. We wish there were objective methods for measuring these gains, for *the entire camp staff is convinced that, in our new programs, results are better in this important field also than in the old program which left health improvement largely to chance.*

"TWO-WEEK" BOYS

As shown in Scattergram A, of 80 different boys remaining in the camp for only two weeks, thirteen show a loss in P.F.I. between their entering and departing scores. Four others remained unchanged. The remaining sixty-three boys show gains.

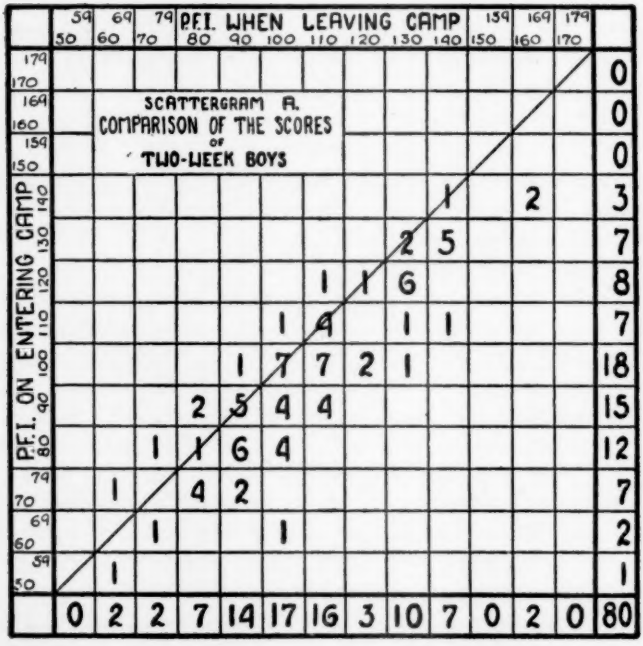
The greatest value of measurement resides in the uses made of results to modify subsequent procedures according to the individual needs revealed. Moreover, the values are greatest for those individuals who

have been benefiting least from the program. A brief analysis of several cases in which losses are shown is included here, to illustrate the uses of test results and the consequences of modifying boys' programs in accordance with revelations.

Of course, nothing could be done for the two-week boys: the second test came the day before they left camp. But the test did indicate their status, and explanations of losses are given below. It is particularly interesting to note the rapid gains in weight for many of these boys, since gain in weight is not indicative of improvement in physical fitness.[5]

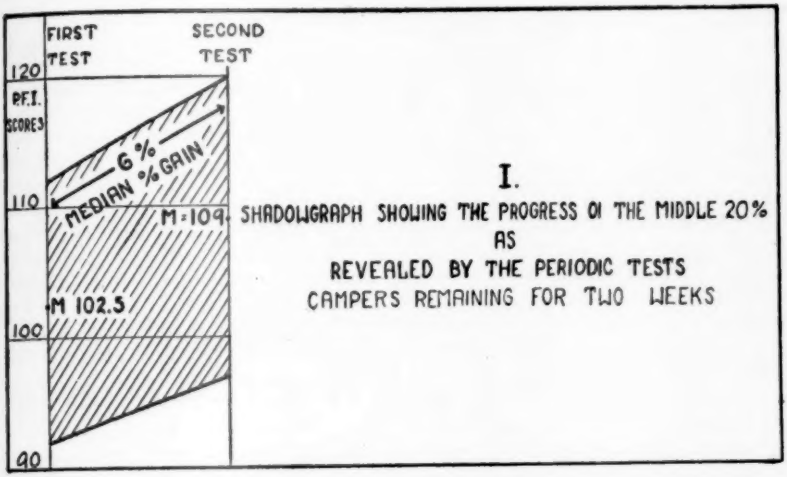
Case L.C.: (P.F.I. 93 to 84). A gain of 4 pounds in weight plus an unwillingness to be retested, one of the rare cases of this nature encountered. This boy was sent to camp by the Anti-Tubercular Association. His scores were reported to the officials responsible for sending him to camp, with the suggestion that he be watched closely during the fall and winter months. He reports that he has been free from illness since leaving camp and attributes his gain to the program laid out for him while in camp, and followed during the later summer months and fall. His activities this fall and winter have been those of a normal high school boy. Against his wish he was retested on December 29, 1934, and had raised his P.F.I. to 102.

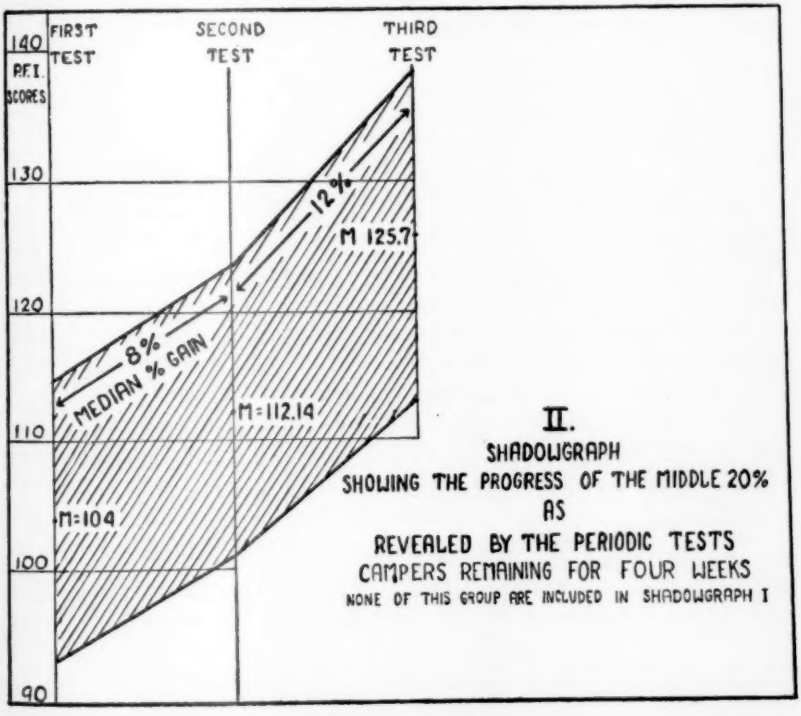
Case E.F.: (P.F.I. 75–68). A mental case sent to the camp by one of the dispensaries. His camp record was sent to the dispensary with the suggestion that he be checked closely during the winter months. He was retested on December 29, 1934, and made a P.F.I. score of 80. Inasmuch as his stay in the camp was from August 18 to September 1, thereby eliminating any building process which succeed-


SCATTERGRAM A.
COMPARISON OF THE SCORES
OF
TWO-WEEK BOYS
P.F.I. WHEN LEAVING CAMP
P.F.I. ON ENTERING CAMP
50 60 70 80 90 100 110 120 130 140 150 160 170
0 2 2 7 14 17 16 3 10 7 0 2 0 80

[5] See Arthur L. Jones, page 146 and James A. Wylie, page 162.

SHADOWGRAPH I





SHADOWGRAPH II

ing summer weeks might have accomplished, is it probable that his gain since leaving camp is, in some measure at least, due to the care he received during his stay at Camp Ousamequin?

Case W.G.: (P.F.I. 123–118). Blisters on both hands due to rowing.

Case R.H.: This boy spent three days in bed with a cold. He lost in weight, in P.F.I. and S.I. In fact, he lost in everything but height. His parents and the school nurse were notified of this condition and asked to have the boy examined thoroughly by their family physician or else send him to a medical clinic. His reaction to a tuberculin test was positive. X-rays of his lungs, however, were negative. The school nurse reported, in November, that he had gained back the three pounds lost at camp plus two more, that for the first time in his life he was playing football and other games with the boys at school and in his neighborhood, and that while in the past he had needed constant prodding from his teachers to keep up in his studies, he was at that time leading his class. His parents, his teachers, and the school nurse believe that his brief stay in the camp, and particularly the special program of exercise, rest, and diet prescribed because of his low P.F.I., were responsible for this change. While in camp the boy seemed dissatisfied and reported that he did not like camp because he was made to exercise. Now he says that he really liked camp and wants to return next season.

Case H.L.: (P.F.I. 137-130). A gain of 4 pounds in weight plus a day in bed immediately previous to the second test.

The explanations of the four cases which remained unchanged are included below. It should be noted that these boys' gains in strength were just proportional to their weight gains.

Case C.D.: Gain of 6 pounds in weight.

Case J.L.: Gain of 4 pounds in weight.

Case C.Mac: Deep cut on the left hand at the time of second test.

Case S.R.: Gain of 5 pounds in weight.

"FOUR-WEEK" BOYS

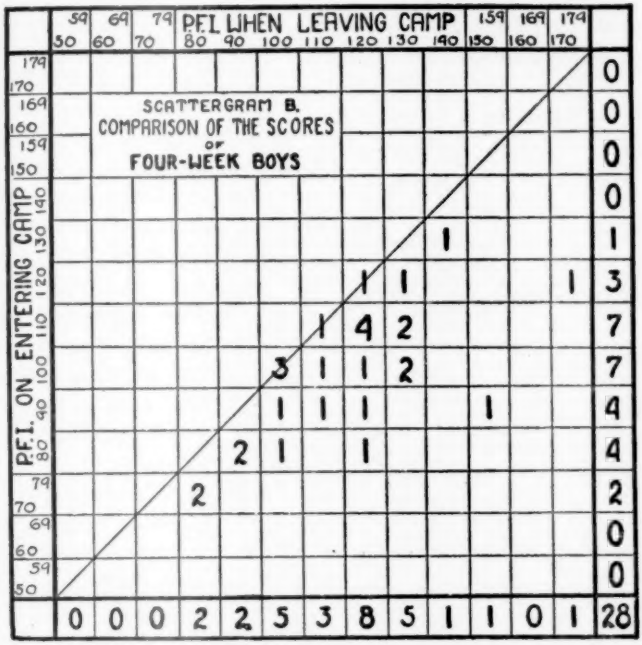
Referring to Scattergram B, which compares the entering and departing scores of the 28 boys who remained in camp 4 weeks, note that the gains were considerably greater than those made by the boys remaining 2 weeks. Here we have a percentage gain of 20.9 as against 6 per cent made by the boys who remained only two weeks. In the four-week group there was only one loss in P.F.I. (See Graph I.) This case—C.S.—is the last one discussed under the four-week group.

Shadowgraph II shows that the gain for this group was greater during the last two weeks than during the first two, but Graph 1 shows that, of these boys, only two lost in P.F.I. during their first two weeks in camp.

Case J.C.: Was nine years and five months old and attending camp for the first time. He experienced difficulty in adjusting himself to the camp life and program. Because of his P.F.I. loss on the second test, he was shifted to another cabin with a group of more congenial boys under a counselor whom he had learned to like. His gain of 14 points in P.F.I. during his last two weeks seems to prove that the shift was a wise one. When he was retested on December 29, 1934, his P.F.I. was 142, exactly the same as his score on leaving camp.

Case R.M.: Lost during the first 2 weeks because of an apparently too-rapid gain of 6.5 pounds in weight. Greater care was taken to be sure that he exercised regularly during his last 2 weeks bringing about a gain of 6 points in his P.F.I.

Graph 1 also shows that eight boys scored lower P.F.I.'s at the end of the fourth week than they had at the end of the second week. In only one case, however, did this loss bring the departing P.F.I. below the entering one.

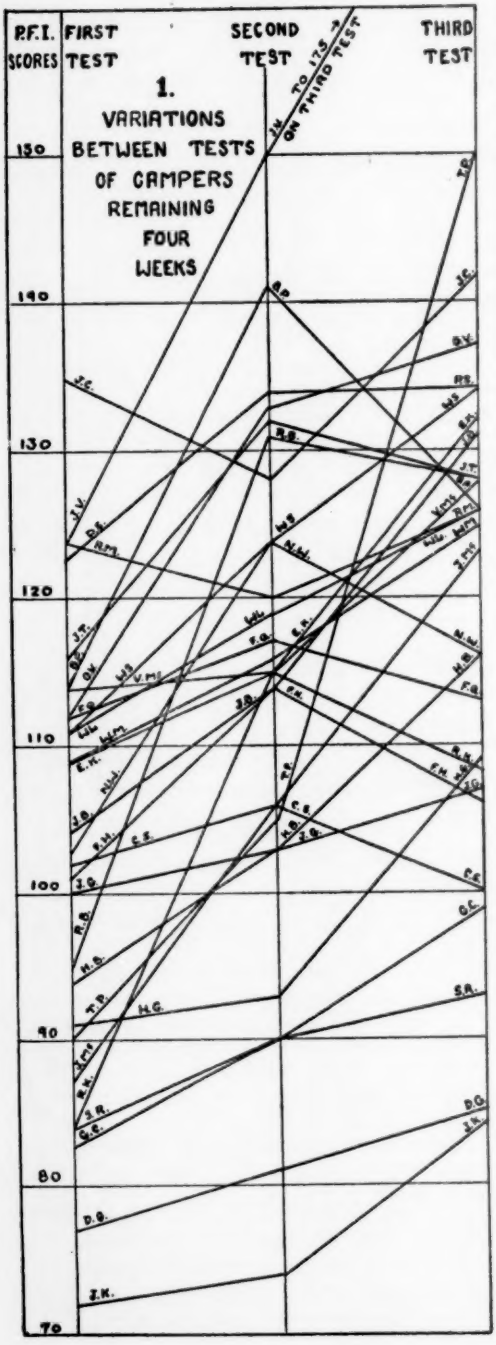


The losses of six of the eight boys may be attributed to the reaction from a too rapid gain in P.F.I. the previous two weeks and to a possible let-up in supervision of program by the camp staff because of the previous gains. The seventh boy's loss was due to a strained wrist which interfered with his ability to perform the test.

Case C.S.: Was sickly when he entered camp and needed rest, fresh air, and good food. He gained 4 P.F.I. points during his first two weeks. He was, however, confined to bed with a cold for 2 days previous to his third test which showed a loss of 6 points, thus leaving him with a final loss of 2 points for his stay in camp.

SIX-WEEK BOYS

Scattergram C compares the entering and departing scores of the twelve boys who remained in the camp for six weeks. The median gain is 31 per cent. No boys lost in P.F.I. *when the entering and departing scores are compared.* We find, however, as shown on Graph 2, that while all the boys showed a gain at the end of the first two weeks, four of them showed slight losses at the end of the fourth week when compared with the scores made at the end of the second week, and two



boys showed slight losses and two stood still at the end of the sixth week, when compared with the scores they made at the end of the fourth week.

Of the four losses at the end of the first month, two may be attributed to reaction to previous fast gains. Increased participation in games and boating resulted in advancing the P.F.I.'s again. A third boy had just returned from a two-day visit with friends. The fourth boy was handicapped on both his third and final tests by an infection on his right thigh.

The second of the two boys showing slight losses between the fourth and sixth week tests had spent two days in bed with a cold before taking the test.

Of the two boys whose scores remained unchanged, one had cut his hand in the shop and the other was in a period of mental unrest due to home conditions and his interest in the camp program had lagged.

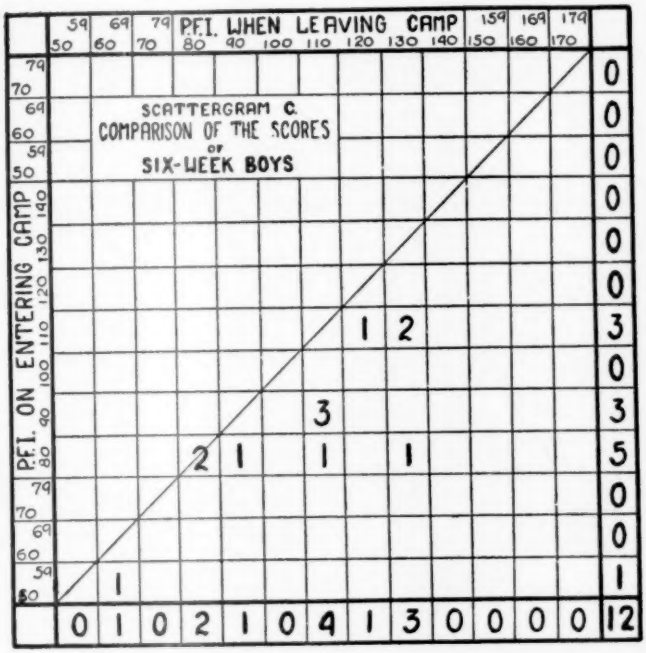
Shadowgraph III gives an interesting picture of the regular gain made by this group of boys throughout their stay.

EIGHT-WEEK BOYS

Scattergram D is a comparison between the

entering and departing scores of the twenty-two boys who remained in the camp for the full season, or eight weeks. As is also shown on Graph 3, only one boy, Case C.J., showed a loss between his entering and departing scores. This boy was not really a camper but part of the kitchen staff. His especially interesting case is discussed below.

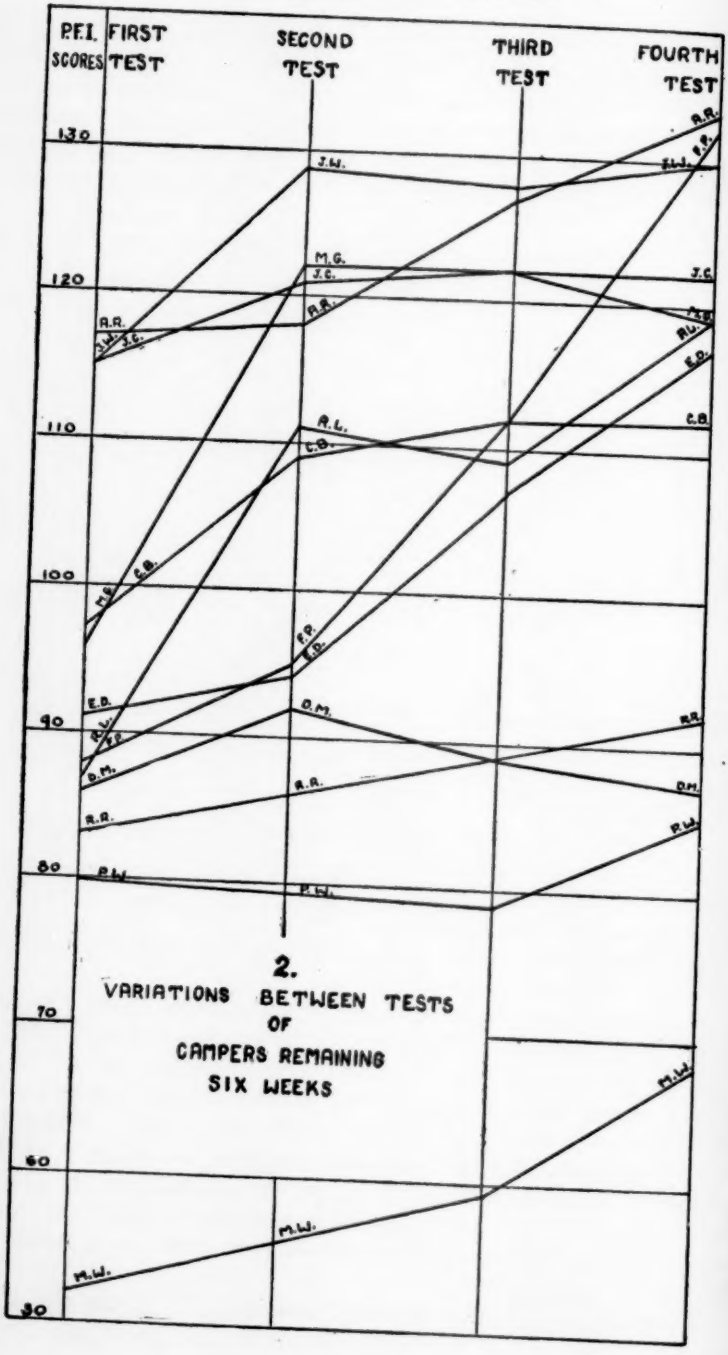
The median per cent gain for this group was 33, again demonstrat-


P.F.I. WHEN LEAVING CAMP
P.F.I. ON ENTERING CAMP
SCATTERGRAM C.
COMPARISON OF THE SCORES
OF
SIX-WEEK BOYS
50 60 70 80 90 100 110 120 130 140 150 160 170
0 0 0 0 0 0 3 0 3 5 0 0 1 12
1 2 3 2 1 1 1

ing the fact that the longer the boys remained in camp the more they gained.

Shadowgraph IV shows the rapid median gain of 21 per cent made by this group during their first two weeks in camp and the steady but slight gain thereafter, with a quickening again the last two weeks. The rapid gain during the first two weeks was due to the close watch kept on these boys because of their low entering scores which ranged from 70 to 114. It was thought inadvisable to push the majority of these boys much higher after the gains of the first 2 weeks, and the program was designed to hold them steady. *In several cases a deliberate attempt was made to reduce the scores of certain boys since it was feared that they were becoming too "fine."*

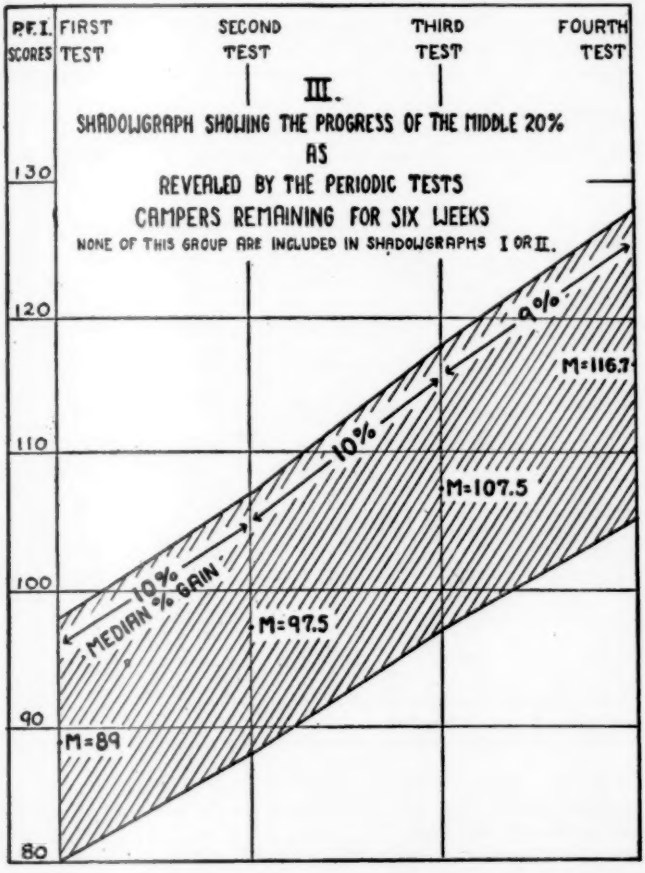
Three eight-week boys showed a loss in P.F.I. at the end of the first two weeks. Two of them had blisters on their hands from rowing.



2.
VARIATIONS BETWEEN TESTS
OF
CAMPERS REMAINING
SIX WEEKS

Case C.T.: This boy was a problem case. His entering P.F.I. was 71. He lost 2 points between his first and second tests. It was felt that he "just did not do his best"; also, he had gained 4 pounds in weight. During the next two weeks, in spite of an additional gain of 2 pounds in weight, he raised his P.F.I. score 8 points and continued to gain during the rest of the season. His departing P.F.I. was 93.

He was inactive and individualistic, preferring to stand on the sidelines and

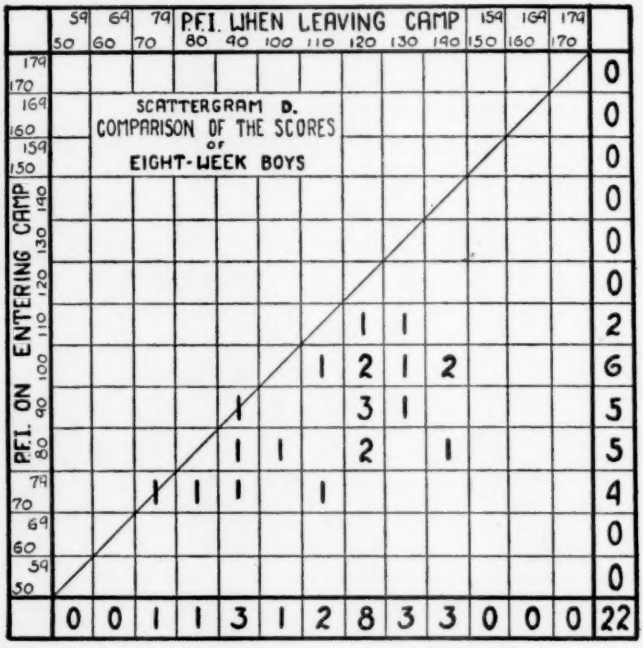


make wise-cracks at the players rather than play himself. After deliberately rowing out of bounds on two occasions during the first week, he was deprived of rowing privileges. However, rowing was prescribed for him along with hiking and swimming, at the beginning of his third week. No attempt was made at this time to coax him into team games. He was, however, always assigned to a team when the various leagues were formed. He began taking part in team games at the beginning of the fifth week. *It is the opinion of the counselors that his behavior improved as his physical fitness improved.*

Between the beginning of the third week and the end of the fourth week, six boys showed losses in their P.F.I. scores.

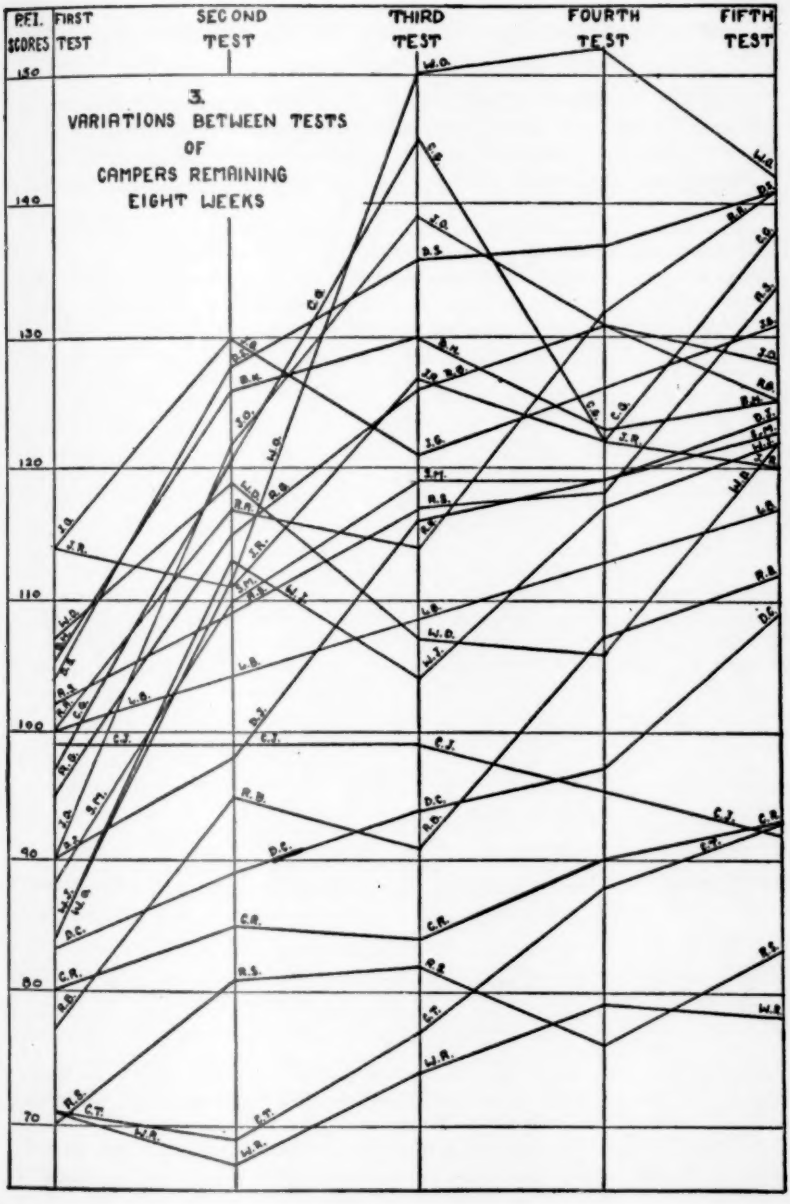
Five of these losses were undoubtedly due to a let-up in physical activity and gains in weight. Increased participation in various types of exercise to meet the individual needs resulted in increased P.F.I.'s on later tests.

Case W.D.: Fifteen years old, he was a "lone wolf" and a problem boy. His only interest seemed to be in things mechanical. During his stay, he took an old victrola apart and tried to put the motor to other uses, finally taking it home with him. He enjoyed going off on walks by himself. He believed he was not as physically fit as other boys, and did not want to be tested in the beginning, because he said


SCATTERGRAM D.
COMPARISON OF THE SCORES
OF
EIGHT-WEEK BOYS
P.F.I. WHEN LEAVING CAMP
P.F.I. ON ENTERING CAMP
50 60 70 80 90 100 110 120 130 140 150 160 170
0 0 1 1 3 1 2 8 3 3 0 0 0 22

that he "would not do as well as the others." However, he scored 107 points and was happy. At the time of the second test, he again did not want to be tested, declaring that he "did not feel good," but finally admitted that he was afraid that he might show a loss. He was coaxed to try the spirometer and showed a gain. This led him to try the hand dynamometer, and he again showed a gain. After this demonstration of his power, he decided that he did not feel so badly and finished the test. His score was then 119, a gain of 12 points.

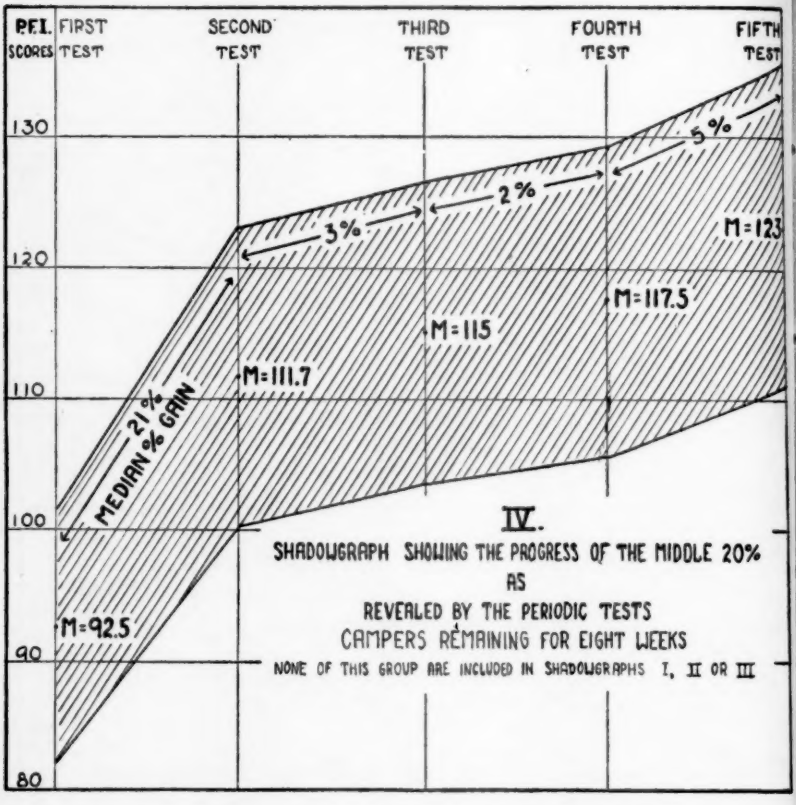
He was willing to be tested the third time, but unfortunately he lost four points on his lung capacity. This being at the beginning of the test, he immediately said that he was "no good" and proceeded to lose on each part of the test. The writer tested the boy alone two days later, making sure that he got a good blow on the spirometer. Due to better technique, he blew as much as he had on his second test, and immediately his attitude changed and he "guessed that he was all 'okeh' again," and proceeded to score 119 on the test. On his fourth test, the same incident occurred; he failed to blow as much on the spirometer as before, and consequently built up a state of mind that caused him to lose on all parts of the test. On his last


REI. SCORES
FIRST TEST
SECOND TEST
THIRD TEST
FOURTH TEST
FIFTH TEST
150
140
130
120
110
100
90
80
70
3.
VARIATIONS BETWEEN TESTS
OF
CAMPERS REMAINING
EIGHT WEEKS

test, the writer made sure that he got off to a good start on the spirometer, with the result that he did well throughout and scored 122 points.

At the beginning of the sixth week, six boys showed a drop in their P.F.I. scores for the previous two weeks:

Case C.G.: This boy, 10 years and 6 months old, entered with a score of 97. At the end of the first 2 weeks, his score has risen to 121 and to 145 at the end of the first month. It was believed that he was gaining too rapidly and a program of more shop work and nature study with less exercise was advised. Evidently his



IV.

SHADOWGRAPH SHOWING THE PROGRESS OF THE MIDDLE 20% AS REVEALED BY THE PERIODIC TESTS

CAMPERS REMAINING FOR EIGHT WEEKS

NONE OF THIS GROUP ARE INCLUDED IN SHADOWGRAPHS I, II OR III

exercise was cut off too abruptly, causing the loss of 23 points noted at the beginning of the sixth week. By allowing him to resume his previous program, he had raised his score to 138 by the time he left camp.

Case J.O.: Had a too rapid gain in weight during this period. Inasmuch as he gained in Strength Index, his loss in P.F.I. is of little concern. He had gained 49 points during the previous six weeks, so that this slowing up was probably a good thing in order to keep him from becoming too "fine" or "stale." Eight days later he fell ill and spent four days in bed with the grippe. Whether this loss at the beginning of the sixth week was a warning signal, we are not prepared to say.

Of the other boys, one was thoroughly discussed above, one was sick in bed the day before the test, another had cut his hand badly enough to interfere with his doing his best, and the last had become an assistant counselor and had spent much time working for his honor emblem, thus neglecting his athletic program.

At the end of the eighth week, five boys showed a loss in their P.F.I. scores as compared with those made at the end of the sixth week. These losses were similar to others previously explained, namely, blisters, sickness, or lack of exercise accompanied by a too rapid gain in weight.

Case C.J.: Previously mentioned as being the only loss in the eight-week group, when the entering and departing scores were compared, was 16 years old. He was taken on in the kitchen at the request of a social agency. They reported that he was undernourished and needed building up. During the previous spring he had been given free lunches at school. At the beginning of camp, his P.F.I. was 99. He did not take the test at the end of the first period. When tested at the end of the month, he again scored 99. He had, however, gained 4.5 pounds in weight and 93 points in S.I. He was not tested again until the end of the eight weeks when it was found that his score had dropped to 92. In the meantime, he had gained another 7.5 pounds in weight and 129 points in S.I.

It should be explained that, as a member of the kitchen staff, he was on duty only every other day, and took part in the regular camp program on the alternating days. His loss in P.F.I. was, therefore, a reflection on his exercise as well as his eating habits. He became fat and soft instead of heavier and "robust" or strong.

A particularly interesting case is that of D.C. who had been very ill before coming to camp. When he entered, his family physician specified plenty of rest and very little exercise. It was thought best, therefore, not to give him the physical fitness tests at that time. He was placed on a schedule of 9 hours sleep at night, an afternoon nap, and mid-morning and mid-afternoon lunches, with plenty of opportunity to be in the sunshine. He was tested at the beginning of the third week, when his P.F.I. was 89. Thereafter he participated in the regular camp program. He was tested at the regular two-week intervals for the rest of the summer, and had a steady gain in P.F.I. to 109 when he left camp. We estimate that his P.F.I. on entering camp was not over 75. His gain for the 8 weeks was, then, about 45 per cent.

We cannot close this summary without repeating that it reports the health objective and program phase of the 1934 Ousamequin Camp. The results were achieved without sacrificing the spirit of adventure and the joy of living. Other programs or adjustments to teach boys various sports, handicraft, campcraft, watermanship, and to develop the social and spiritual phases of their characters, were by no means neglected. Rather were these programs made more effective: *first*, because the boys' improved physical fitness enabled them to enter into more activities more enthusiastically; *second*, because other special adjustments were made to meet the needs of each boy for social development; and *third*, because the health testing and individual needs programs brought to the camp a new standard of accomplishment and a new technique for achieving results.

Part III

Equating Opponents in Sports

"It is not in the spirit of partisans, but of partners, that America has progressed . . .

"You and I acknowledge the existence of unfair methods of competition—of cut-throat prices and of general chaos. You and I agree that this condition must be satisfied and that order must be restored. The attainment of that objective depends upon your willingness to cooperate with one another . . . and to cooperate with your government . . .

"The Nation does not merely trust or hope that we will do our duty—the Nation is justified in expecting that we will do our duty."

—Franklin D. Roosevelt.

The Doctrine of Equality*

A GANG of boys "choosing-up-sides" preparatory to a sandlot baseball game has a profound symbolic significance: it dramatizes the instinctive desire of children to play with their equals.

In the absence of third parties (coaches, spectators, reporters, parents, etc.) children and animals truly play, even in formalized combat. Not victory is their object, but *the game!* Physiologically their impulse is to exercise muscles and senses; psychologically their urge is to overcome obstacles; reasonably their desire is to seek obstacles worthy of their mettle; sociologically their impulse is to seek more, and more intimate, contacts with other individuals of the same species. Methodologically their procedure is to divide into opposing groups of equal numbers (pom-pom-pullaway, run-sheep-run, football, baseball); or equal skills (mumble-d'-peg, marbles, tennis); or equal physical size (boxing, wrestling, football)—but always the ideal of equality is present in practice.

The outcomes of such contests include improved physical vitality, increased skill and knowledge, deeper insight into playmates' natures —and even one's own—and joy. Above all, joy—happiness—satisfaction, but satisfaction chiefly in the sense of increased control over environment through greater skill, deeper friendships and heightened awareness, rather than in personal triumph over the ego of a friend-in-play.

In the absence of rational guidance the tendency of the schoolboy sports seems, until lately, to have been away from equality-for-the-sake-of-joy to superiority-for-the-sake-of-personal-dominance. Joy-in-play was subordinated to striving-for-victory. This tendency was imposed from above—by coaches, principals, sport news, parents: in short, the "third parties." Left to themselves, boys and men in every walk of life and in every sport have always reverted and still do, to a striving for equality, a tendency which is charmingly manifest in the play of kittens or dogs: *as soon as one clearly gains the upper hand, he relinquishes his advantage.*

Which alternative is more rational, the adjustment for equality or the struggle for superiority between friendly opponents in games? Which yields more lasting satisfactions? Which better develops skill and health and citizenship? Schoolmen ought to know. . . .

---

* This doctrine must be older than the hills. It has been restated in many ways and adapted in various forms by various groups. The ideal exists in one-design class yacht racing. Other discussions of this topic by the author of these comments may be found in *Physical Capacity Tests in the Administration of Physical Education*, 1925, Chapters I, III, VIII; *Test and Measurement Programs in the Redirection of Physical Education*, 1927, Part I; *The Amateur Spirit in Scholastic Games and Sports*, 1929, Chapter V; *Educational Objectives of Physical Activity*, 1929, pages 17–18; and *Fundamental Administrative Measures in Physical Education*, 1932, Chapter XII.

The following very brief analysis provides a theoretical answer to the problems suggested above. The succeeding reports of Part III provide exhibits relating to the application of theory to practice.

THE DOCTRINE OF EQUALITY

The doctrine of equality may be stated briefly thus: "In 'competitive' activities, educational objectives and the canons of fair play will be realized most completely only when the powers of opposing individuals or teams have been equalized."

The mere statement of this doctrine is sufficient to convince most persons of its validity; and certainly the latest trend, even in intercollegiate football, is definitely in the direction of active acceptance of the principle. *To prove the axiom—to accelerate this movement toward active and efficient equalizing of opponents—is the purpose of this part of the Supplement.*

In addition to observations and arguments printed elsewhere, the following general propositions are offered here. First, the foundation of friendship is equality, as was adequately stated by Cicero in his *Amicitia* when he urged as his fourth rule for friendship: *put yourself on a level with your friend.* Since the chief objective of play is joy in activity, and since joy is in direct proportion to one's identification of oneself with one's friends' purposes and joys, the significance of Cicero's adjuration is inescapable. The sportsman who would enjoy himself and give enjoyment to his friends in play will "put himself on their level."

Second, equality is at the heart of most of our modern political theory —particularly the "New Deal"—and even of many religions. Certainly Christians, above all, will endorse the doctrine. . . .

Third, many commentators lose themselves in a maze of conflicting concepts when they attempt to reconcile "equality" with self-preservation." The complete answer is contained in the biological fact that, in the long run, those individuals and species who survive are essentially and increasingly cooperators rather than competitors. But this is another story. Short of this philosophical entanglement it is significant to remind ourselves that school people believe survival, or at least good citizenship, comes through adequate or increased or superior health and social efficiency.

These qualities are definitely promoted by equality between opposing teams in sport.

OBJECTIVES SERVED BY EQUALITY

Among the educational objectives served by equality, social efficiency qualities stand out. These are initiative, courage, self-control, perseverance, honesty, justice, courtesy, cooperation, sympathy, loyalty.

Of these, it must suffice here to explain only two, say initiative and "fair play," which is the composite of honesty, justice, and courtesy. Let the reader imagine, now, two game situations. In one the opponents

are badly matched—the score is 60-0. Will initiative be greatly developed for winners *or* losers? Remembering that success and satisfaction are necessary to most learning, how can the losers be stimulated to initiate? Each new effort is met with overwhelmingly superior power and ends in disappointment, etc. Nor will the winners develop their initiating powers. It isn't necessary—any *old* method will do. Why experiment? And even if innovations are attempted and succeed, what is learned or proved? Victory would have accompanied almost any alternative.

But when opponents are approximately equal, initiative is promoted. For it is chiefly by initiating—experimenting—taking chances—that the deadlock is broken! Thus equality provides the very best conditions not only for stimulating initiative but for proving its value as well.

Fair play presents a different—a moral—condition. Of course, fair play is the essence of good sportsmanship. And the essence of fair play is that one is *just*—one refuses to give or receive special advantages to or from opponents. One does not kick one's opponents when they are down! Nor does one use twelve men against eleven men. It would be *unfair, unsportsmanlike.*

But *numbers* of players is a crude measure of power. Almost any football coach seeking victory would prefer ten strong men to eleven or twelve or thirteen weak men. Indeed, the aim of most football coaching and training is just to find and strengthen—and perfect the playing skill of—the largest men. Therefore, the educator interested in teaching good sportsmanship to his boys or girls refines his measures, the better to equalize the *playing powers* of opponents—the better to teach fair play. Indeed, in no other way can he really inculcate the essential habits and attitudes of fair play.

Similar explanations may easily be given by interested readers to show how equality protects health and promotes other social objectives. And of course joy in play is increased immeasurably, by reducing the differences between opponents, and even *proportionately* to the degree of equality achieved! Let theorists who exalt the value of joy in physical education take up the practical adjustment of equality between opponents and promote it with equal fervour! For talking about joy does not necessarily produce joy, but equalizing teams does. May we not even assert that talking about equality probably produces more joy than talking about joy?

Nor are the administrative advantages of equalizing opposing teams much less important. Emphasis on victory is lessened (for winning means, perhaps, only that teams are not equal!) which lessens the strain on referees, therefore the need of paying referees (so much). Interest in games increases, therefore players' attendance is more regular. Games are not forfeited. Discipline is self-imposed. The need of prizes, banners, trophies is reduced, even to nil. The joy of playing is enhanced, and the thrill of success is within the reach of all.

The following very brief analysis provides a theoretical answer to the problems suggested above. The succeeding reports of Part III provide exhibits relating to the application of theory to practice.

THE DOCTRINE OF EQUALITY

The doctrine of equality may be stated briefly thus: "In 'competitive' activities, educational objectives and the canons of fair play will be realized most completely only when the powers of opposing individuals or teams have been equalized."

The mere statement of this doctrine is sufficient to convince most persons of its validity; and certainly the latest trend, even in intercollegiate football, is definitely in the direction of active acceptance of the principle. *To prove the axiom—to accelerate this movement toward active and efficient equalizing of opponents—is the purpose of this part of the Supplement.*

In addition to observations and arguments printed elsewhere, the following general propositions are offered here. First, the foundation of friendship is equality, as was adequately stated by Cicero in his *Amicitia* when he urged as his fourth rule for friendship: *put yourself on a level with your friend.* Since the chief objective of play is joy in activity, and since joy is in direct proportion to one's identification of oneself with one's friends' purposes and joys, the significance of Cicero's adjuration is inescapable. The sportsman who would enjoy himself and give enjoyment to his friends in play will "put himself on their level."

Second, equality is at the heart of most of our modern political theory —particularly the "New Deal"—and even of many religions. Certainly Christians, above all, will endorse the doctrine. . . .

Third, many commentators lose themselves in a maze of conflicting concepts when they attempt to reconcile "equality" with self-preservation." The complete answer is contained in the biological fact that, in the long run, those individuals and species who survive are essentially and increasingly cooperators rather than competitors. But this is another story. Short of this philosophical entanglement it is significant to remind ourselves that school people believe survival, or at least good citizenship, comes through adequate or increased or superior health and social efficiency.

These qualities are definitely promoted by equality between opposing teams in sport.

OBJECTIVES SERVED BY EQUALITY

Among the educational objectives served by equality, social efficiency qualities stand out. These are initiative, courage, self-control, perseverance, honesty, justice, courtesy, cooperation, sympathy, loyalty.

Of these, it must suffice here to explain only two, say initiative and "fair play," which is the composite of honesty, justice, and courtesy. Let the reader imagine, now, two game situations. In one the opponents

are badly matched—the score is 60-0. Will initiative be greatly developed for winners *or* losers? Remembering that success and satisfaction are necessary to most learning, how can the losers be stimulated to initiate? Each new effort is met with overwhelmingly superior power and ends in disappointment, etc. Nor will the winners develop their initiating powers. It isn't necessary—any *old* method will do. Why experiment? And even if innovations are attempted and succeed, what is learned or proved? Victory would have accompanied almost any alternative.

But when opponents are approximately equal, initiative is promoted. For it is chiefly by initiating—experimenting—taking chances—that the deadlock is broken! Thus equality provides the very best conditions not only for stimulating initiative but for proving its value as well.

Fair play presents a different—a moral—condition. Of course, fair play is the essence of good sportsmanship. And the essence of fair play is that one is *just*—one refuses to give or receive special advantages to or from opponents. One does not kick one's opponents when they are down! Nor does one use twelve men against eleven men. It would be ***unfair, unsportsmanlike.***

But ***numbers*** of players is a crude measure of power. Almost any football coach seeking victory would prefer ten strong men to eleven or twelve or thirteen weak men. Indeed, the aim of most football coaching and training is just to find and strengthen—and perfect the playing skill of—the largest men. Therefore, the educator interested in teaching good sportsmanship to his boys or girls refines his measures, the better to equalize the *playing powers* of opponents—the better to teach fair play. Indeed, in no other way can he really inculcate the essential habits and attitudes of fair play.

Similar explanations may easily be given by interested readers to show how equality protects health and promotes other social objectives. And of course joy in play is increased immeasurably, by reducing the differences between opponents, and even ***proportionately*** to the degree of equality achieved! Let theorists who exalt the value of joy in physical education take up the practical adjustment of equality between opponents and promote it with equal fervour! For talking about joy does not necessarily produce joy, but equalizing teams does. May we not even assert that talking about equality probably produces more joy than talking about joy?

Nor are the administrative advantages of equalizing opposing teams much less important. Emphasis on victory is lessened (for winning means, perhaps, only that teams are not equal!) which lessens the strain on referees, therefore the need of paying referees (so much). Interest in games increases, therefore players' attendance is more regular. Games are not forfeited. Discipline is self-imposed. The need of prizes, banners, trophies is reduced, even to nil. The joy of playing is enhanced, and the thrill of success is within the reach of all.

METHODS OF EQUATING OPPONENTS

The educational and administrative values of equality emphasize the importance of using the best methods of equating opponents. "The more nearly equal the better the results," simply forces educators to seek the best.

However, "best" means "most useful, all things considered." A method which effected absolute equality but took longer to apply than to play the game would probably be less helpful, all things considered, than one which only approximated the ideal. The latter method might even be more useful, since it is better in practice to both win and lose than always to be tied. This eventually is effected by matching the same teams several times or in different sports.

Methods of equalizing teams which have been used by sports managers and directors include among others the following interesting list: setting age or height or weight limits or combinations of these, matching weights, setting total weight limit for teams, choosing up sides, selection of teams by coaches or directors or managers, establishing major and minor leagues, using school enrollment to determine eligibility for leagues, handicapping performers by distance or time or weight carrying, use of Strength Index limits or levels or averages, setting horsepower limits for automobiles, or piston surface or cylinder area; and, in yacht racing, setting limits of overall length, waterline length, draft, beam, freeboard, overhangs, sail areas, sail spreads, sail plans and the use of gadgets.

Of these, the most generally effective for schoolboy sports seems at present to be either the Strength Index or some other direct measures of strength. Of necessity this Supplement includes chiefly reports of experiments using the S.I. Doubtless there are other more valid measures; but perhaps there is none so economical, for the S.I. is determined quickly. A ten-minute period for the individual and "one-pupil-a-minute" for testers is sufficient. Moreover, the S.I. is available without further tests to all directors who use the P.F.I. for classification purposes in physical education. The effectiveness of the S.I. is attested in several of the succeeding reports.

However, the chief value of the following reports does not reside in their demonstration of the validity of any particular system of measurement, but in their demonstration that approximate equality may be and is effected in real situations as a routine procedure and is effective in increasing the efficiency of sports as educational programs and as means of enjoying sports.

Equalizing the Abilities of Intramural Teams in a Small High School

By H. Harrison Clarke and Harold A. Bonesteel

EQUALIZING the athletic abilities of individuals or teams is a recent innovation in intramural athletics which promises greatly to increase student interest in intramurals, develop desirable social qualities in participants, and solve many an administrative problem. The theory that educational objectives will be realized most completely and that the interest of players will be maintained for the longest period of time when intramural teams are evenly matched is sound educational philosophy. When teams are equal, players are more active, cooperation is essential, and initiative and courage are necessary requisites to playing the game "successfully." Particularly does increased interest in games, which equality guarantees, greatly reduce administrative difficulties. Attendance should be more prompt and regular; forfeitures should be fewer; discipline better; quarrels over officiating, victories, and prizes, should be fewer. The enthusiasm of players for their games should promote greater interest in the entire intramural program.

But some intramural directors avoid this function of *seeing to it* that opponents in games they organize are fairly matched. Sometimes they fear the work involved, or the conflicts with selfish or self-seeking fraternities. Sometimes they simply have not yet accepted the duty to insure fair playing conditions as one of their chief responsibilities.

This report, showing what can be done in small schools, should be reassuring to physical educators generally, but particularly to those who themselves serve in small schools.[1]

Since equalizing the athletic powers of opposing teams is a sound educational procedure, an objective method for determining these powers should be of considerable administrative service to the educator. This article reports the results of a study in which strength tests were used to equalize the ability of intramural teams. The experiment was conducted at Manlius High School, a small centralized school of 184 pupils located in central New York state.

PROCEDURES

The Subjects.—The subjects were sixty-six boys in the Manlius High School who were equated and placed on six teams of eleven boys each. Due to inability to schedule these teams for competition at the

[1] The various Albany reports reveal the values of equalization in large schools. See pages 202 to 226. (Ed.)

same time, it was necessary to form three groups of two teams each. All games conducted in the experiment were thus held between the two teams in each group. The results of the equating that follow should be interpreted with this grouping in mind.

The Tests.—Physical fitness tests were used to equate the teams—the "P.F.I. battery." It should be pointed out that there are at least two fundamentally different uses for these tests: First, the *Physical Fitness Index* is used as a measure of health or of general physical condition. Second, the *Strength Index* is used to determine general athletic ability.[2] Within the scope of this second use of the tests would come that of equalizing the athletic ability of competing groups. Therefore, the *Strength Index* was used to equate the intramural teams participating in this experiment. The results of this equating are found in Table I.[3]

TABLE I
EQUATING OF THE THREE GROUPS OF INTRAMURAL TEAMS ACCORDING TO THE STRENGTH INDEX

Designation of Intramural Teams	Strength Index	
	Mean	Standard Deviation*
Group I		
Team A	1392	347
Team B	1405	455
Group II		
Team C	1251	317
Team D	1351	336
Group III		
Team E	1334	300
Team F	1328	310

* S.D.'s are much larger than they should be. This condition was made necessary, however, by the small numbers of boys available.

The Sports.—After the opposing units in this experiment were equated, a series of games was held between the teams in each group. The sports used were touch football, speedball, field hockey, and indoor soccer. All of these activities were relatively unfamiliar to the players. Also, in order to eliminate a transfer of experience from football to touch football, the members of the varsity football squad were eliminated from the experiment. The factor of previous experience with particular sports was thus held fairly constant.

It should be definitely understood that the Strength Index is pro-

[2] This is correct for boys and men. For girls and women who engage in competitive sports the P.F.I. is the better equalizing measure. (Ed.)

[3] The Physical Fitness tests were administered by a group of physical education students at Syracuse University. These students had had considerable previous experience in giving these tests to high school and college students.

posed as a measure of *general athletic ability*,[4] and must not be conceived as measuring skill in any particular sport. An individual with high general athletic ability should perform well, or have capacity for good performance after a training period, in a number of activities. Previous experience, therefore, is a factor that is not fully controlled in a measure of general ability. The use of sports that are not well known by the subjects should, as a consequence, be a fair test of the S.I. especially as a measure of potential general athletic ability.

RESULTS OF THE EXPERIMENT

Results in Terms of "Victories."—This experiment of equating teams for intramural competition in touch football, speedball, field hockey, and indoor soccer, proved successful. The results of the games played between the equated teams were close, while many ended with tie scores. *It should be noted that, of sixty-four games played by all teams in the four sports, twenty-nine, or 45 per cent, were tie games.*

TABLE II

THE NUMBER OF GAMES WON AND TIED IN THE FOUR SPORTS CONDUCTED BETWEEN INTRAMURAL TEAMS EQUATED BY THE STRENGTH INDEX

Designation of Intramural Teams	Touch Football	Speed-ball	Field Hockey	Indoor Soccer	All Sports
Group I					
Team A—Games Won	3	1	2	2	8
Team B—Games Won	1	3	1	0	5
Tie Games	3	3	0	1	7
Group II					
Team C—Games Won	2	2	2	2	8
Team D—Games Won	2	1	1	1	5
Tie Games	5	4	1	0	10
Group III					
Team E—Games Won	2	1	1	1	5
Team F—Games Won	1	1	1	1	4
Tie Games	5	4	2	1	12

Results in Terms of Scores.—In Table III will be found the total number of points scored in each sport by the intramural teams participating in the experiment. The results of this tabulation again indicate the degree of equality of the abilities of the equated teams. The greatest scoring difference between any two teams for all four sports was eight points between Teams A and B, or 2.4 per cent of the total number of points scored by both teams. *The least difference was three points between Teams E and F, or .9 per cent of the combined score of the two*

[4] F. R. Rogers. *Fundamental Administrative Measures in Physical Education*, p. 135. Newton, Mass.: The Pleiades Co., 1932.

teams. Inspection of Table I will show that these latter two teams were the most evenly equated of any of the groups.

TABLE III

THE NUMBER OF POINTS SCORED IN THE FOUR SPORTS CONDUCTED BETWEEN INTRAMURAL TEAMS EQUATED BY THE STRENGTH INDEX

Designation of Intramural Teams	Games Played	Points Scored				
		Touch Football	Speed-ball	Field Hockey	Indoor Soccer	All Sports
Group I	20					
Team A	—	38	59	9	62	168
Team B	—	32	63	7	58	160
Group II	23					
Team C	—	56	45	8	65	174
Team D	—	56	45	9	58	168
Group III	21					
Team E	—	52	44	7	56	159
Team F	—	54	46	7	55	162

SUMMARY

In this study six intramural teams of eleven individuals each were equated in terms of the Strength Index. These six teams were arranged in three groups of two teams each, and a series of intramural contests was conducted within each group. The sports used in the experiment were touch football, speedball, field hockey, and indoor soccer. The results show that the games played between these teams were very close, that equating intramural teams with the S.I. is a satisfactory procedure for the small high school, particularly when previous experience of game skills is not an important factor.

Bonesteel, who conducted the games, noted that during the experiment no boy was absent from any of the games in which his team was scheduled to play, regardless of the fact that the boys were unaware an experiment was being conducted. From observation of the games, it was evident that all of the boys were enthusiastic and active participants. No disciplinary problems arose during the entire experiment. Each boy had a part to play in the games and felt a definite responsibility for his team's success.

This may be considered an excellent teaching situation from which desirable educational objectives as well as recreational pleasures should be realized.

Strength Testing Program Applied to Y.M.C.A. Organization and Administration*

By Harry Gordon Oestreich

Introductory Remarks.—The Young Men's Christian Association administers to the social, mental, spiritual, and physical needs of boys and men. The scope of its work is broad, both quantitatively and qualitatively; its field is the world, and its subject the whole youth.

This report is primarily concerned with the Association's physical department which carries on its manifold functions in the gymnasium. Here, at various hours of the day, groups gather for physical activity—young men, middle-aged men, and old men. Each individual has his own personal purpose for being in attendance. The youth faction craves invigorating, exciting, and stimulating recreational activity, while the older men long to regain their waning youth by refreshing and constructive indulgence in physical activities.

Each group, of necessity, needs to be treated in a different manner. Still more specifically, each individual making up the various groups has his own personal problems which must be met. These particular difficulties must be determined and adjusted by independent administrative measures, distinctive program content, and individualistic methods of procedure.

The Problem Specifically Stated.—This study aims to apply a strength-testing procedure[1] to Y.M.C.A. organization and administration of the "junior" and "high school" groups of its physical education program, and therefrom to determine the utility of this test as an objective measure to facilitate the attainment of the aims and plans of that department.

In an effort to attack the problem set forth above, the investigator set up experiments in the following fields and evaluated their resulting data:

1. Equalization of team competition by the use of the Strength Index and its implications to "Y" gymnasium work.
2. Diagnosis of pupil health status.†
3. Determination of degree of progress in physical fitness.†
4. Measurement of program.†

* This report is an abstract of the writer's Master's Thesis which is on file in the Boston University Library. The data and conclusions on equalizing teams are reported in this outline.

[1] Specifically, the P.F.I. test battery.

† Reported in the author's Master's Thesis but not included in this study.

5. Elimination of some of the evils of absences, and the ascertainment of new pupil relations.†

6. Determination of the degree to which strength tests facilitate classroom organization which is disrupted by the uncertain character of membership tenure.†

7. Maintenance of pupil interest in work by the use of a vital testing program.†

8. Study of posture by silhouettograph and strength scores.†

Site of Study.—The study was made at the Salem, Massachusetts, Y.M.C.A. where, through the interest of Mr. Charles Curtis, Physical Director, the classes were organized in terms of the experiment.

Testing Procedure.—The silhouettograph posture ratings and the various elements of the P.F.I. tests were given to all pupils comprising the "junior" and "high school" groups. Tests were given on Tuesdays and Thursdays, in the following order and by the following testers:

First day:	
1. Age	Given by a leader
2. Weight	Given by a leader
3. Height	
4. Push-up	Given by Mr. Curtis
5. Pull-up	Given by Mr. Curtis
6. Right Grip	Given by the writer
7. Left Grip	Given by the writer
Second day:	
8. Back Lift	Given by the writer
9. Leg Lift	Given by the writer
10. Lung Capacity	Given by Mr. Curtis
11. Silhouettograph	Given by a leader
Recording of scores:	By leaders

Subsequent re-examinations duplicated the details of the first test except that five boys completed their second test in but one period. The techniques followed in giving these tests as outlined in the manual, *Physical Capacity Tests*,[2] were closely adhered to.

Experimental and Control Groups.—The "junior" class was utilized as the control group where class method, program content, and administration remained the same as had previously been the practice in the department. Teams were organized by the "choose-up-sides" method, and squads were organized for apparatus work on the basis of the subjective judgment of the director.

The "high school" class was handled as the experimental group where the following changes were made:

1. A basketball league was formed wherein teams were equalized on the basis of the Strength Index.

---

† Reported in the author's Master's Thesis but not included in this study.

[2] A. S. Barnes & Co., New York, 1929.

2. The groupings for general skill work were made by utilizing the Physical Fitness Index.

3. More time was allotted to games and less time was devoted to calisthenic drills and marching tactics.

THE EQUALIZATION OF TEAMS ON THE BASIS OF THE STRENGTH INDEX

Preliminary Experiment.—An Initial League was formed by the writer by choosing teams which were equalized on the basis of the Strength Index. This league played 18 games. The scores of the games played were surprisingly close; incidentally, the first 3 games were ties. By consulting the following table the reader will note that in 61 per cent of the games the difference was no greater than 4 points, in 89 per cent of the games the difference was 9 points or less. The greatest difference was 13 points, while the median was 3.5 points.

In the difference of the average Strength Indices of the teams, each game taken separately, the team with the highest Strength Index won eight games, lost six, and tied four. Taking the games in which the strongest team lost, there seemed to be a tendency for the defeat to be more decisive the nearer the team difference approached equality.

Control and Experimental Groups.—Not having a comparative basis to evaluate the results of the first league, the investigator reorganized the group into two leagues: one, the Berry League, was made up of four teams equalized by the Strength Index scores, the other, called the Pick-Up League, consisted of three teams organized by the "choose-up-sides" method. This second league may properly be called the "control group" since the method used to equalize opposing teams was that usually followed in the Salem Y.M.C.A. Indeed, it is the method usually followed elsewhere; and many directors inexperienced in strength test techniques of equalization frankly prefer their subjective judgments to the results of standardized objective tests.

The Berry League played 26 games. The results very nearly duplicated the findings of the Initial League, the difference being in favor of greater equality for the Berry League. Seventy-two per cent, or 18 out of the 26 games played, ranged from ties to a 9-point difference. *Forty-four per cent, or 11, of the 26 total games were either ties or teams were separated by but 1 point.* Here the largest difference in team scores was 16, and the median was 3.4 points.

It is interesting to note how closely the percentages resemble each other in the Initial League and the Berry League. In both instances there is a significant tendency for the score to group toward the tie end of the table.

The Pick-Up League played eighteen games with differences in scores ranging from but a single tie to a thirty-point margin, the median falling on six points. Table I records a percentage study of these differences.

Conclusions and Inferences.—From the data gathered concerning the Initial League and the Berry League, in addition to their contrast with the Pick-Up League, the following inferences may be drawn:

1. The general existence of low score differences for league games in which equalization was secured by means of S.I. technique tend to show the superiority of the S.I. as a basis for equalization over the traditional "choose-up-sides" method. In terms of scores, the S.I. is twice as effective in equalizing teams as is the "choose-up-sides" method.

2. The fact that only one out of the forty-four games played by the two equalized leagues could not have been played under ordinary Y.M.C.A. gymnasium conditions demonstrates the practicability of the S.I. technique. It is, in fact, a method which can readily be adapted to variable elements, such as absences, program changes, or new member adjustments.

TABLE I

COMPARATIVE SCORES OF BASKETBALL GAMES PLAYED BY DIFFERENTLY ORGANIZED TEAMS AND LEAGUES

Point Difference in Score	Initial League	Berry League	Pick-Up League
0 — 4	61%	72%	44 %
5 — 9	28%	20%	28 %
10 — 14	11%	4%	17 %
15 — 19		4%	
20 — 24			5.5%
25 — 29			
30 — 34			5.5%
	100%	100%	100 %
Median Difference	3.5 points	3.4 points	6 points

3. The superiority of the equalized league results over those of the Pick-Up League accentuates the value of the former.

4. The boys' interests were guided and directed in several ways by the new technique:

a) They were less interested in game scores and more interested in the games themselves. After several weeks of play, the boys ceased to ask about the scores or the standings of their teams in the league. The value of this phenomenon will be appreciated by players, who derive infinitely more joy from playing; by administrators, who must see in it a great lessening of disciplinary problems; by general secretaries, who will recognize that greater joy and fewer quarrels mean better satisfied members; by parents, who will have real evidence that their boys are growing up into good citizens.

b) At the conclusion of the experiment the boys asked if the spring and summer baseball leagues could be organized on the same basis of

equality. This request came unsolicited, and is perhaps the best evidence of the success of the experiment.

5. Team play developed much more rapidly in the equalized league; evidently equalization promotes the cooperative spirit as well as better basketball.

6. The fact that one team is slightly stronger in terms of strength than its opponent does not guarantee a victory for that team, for small differences may be overcome by other qualities such as leadership and team play. In fact, indications are that equalization tends to encourage such qualities.

7. A careful analysis of the games in which the stronger team was tied or defeated revealed that specific team strategy, cooperation, or some special skill was able to overcome the obstacles which were generally "within reasonable range."

SUMMARY AND RECOMMENDATIONS

Equalization of Teams on Basis of Strength Index.—1. Teams which are equalized on the basis of S.I. are equalized for activities which involve general athletic skill.

2. The scores of basketball games played by equalized teams were much closer than those of teams selected by the "choose-up-sides" method.

3. Team play developed more rapidly in equalized leagues.

4. The equality policy held pupils' interest more strongly than did the "pick-up" or "choose-up-sides" method; first, because the scores of the games were close; second, equality was not disrupted by absences; third, substitutions appeared fair to members because a definite policy was followed; and fourth, the boys recognized that they were part of a "scientific system," and psychologically their egos were stimulated.

5. From the viewpoint of the director, the disorganizing influences of absences and new members being added to the personnel were decreased immeasurably by the use of S.I. techniques. Organization and administration of class work became spontaneous.

Equating Opponents in Junior High School Activities

By Walter A. Cox and Kenneth B. DuBois

IN THE fall of 1932 a project of experimentation was started in Albany to work out a more satisfactory plan for grouping junior high school pupils in the various activities of the intramural program. The data recorded in the following reports represent the findings of this effort up to the present time. It is offered not as a finished piece of research but rather as an example of a cooperative effort on the part of our physical education staff members to seek out facts from which could be built a sound and forward looking program. The P.F.I. tests were used as the basis for this project because they had been used in Albany for a number of years to classify pupils in regular physical education classes. It was desired to use the data secured from these tests to improve and redirect the intramural program; and it should be remembered that throughout our five reports we used S.I. data from regular tests made each spring for purposes of P.F.I. classifications in required physical activities. Thus, S.I.'s were not as truly representative of strength-at-the-time-of-participation as they would have been if special tests had been given just before the experiments began. That results are as good as they are is a special guarantee not only that the S.I. technique is sound, but also that the intramural director need not engage in arduous pretesting of participants in sports; but only if, of course, P.F.I. tests are given to pupils as regular physical education techniques.

All members of the staff who work with junior high school pupils have been actively engaged in the project. It has been a cooperative undertaking from the beginning, with everyone sharing in the work of conducting the events and in the satisfaction of the success so far achieved.

The data included in the following reports have all been taken from our departmental records of the work carried on by the following members of our staff:

Ben M. Becker, John L. Blair, J. Edgar Caswell, Miriam F. Collins, John Dobris, Marjorie Dunn, Elizabeth Friend, Mary F. Garry, Louis D. Krouner, Ethel M. Lang, A. Burnette Lurass, Alice S. O'Hara, Margaret O'Rourke, Jane M. Riley, Elnora V. Seubert, Anna M. Sterling, Nathan Sutin, Charles S. Walker, and Mildred A. Wilson.

Equating Opponents in Junior High School Track and Field Events

By the Albany Physical Education Staff

THE BENEFITS to be derived from athletic competition should be available to every pupil in our schools. One fundamental prerequisite to the achievement of this aim must be the development of some plan to equate groups and individuals in order to secure equality in opportunity and participation.

The necessity and values of equality between opponents have been outlined elsewhere.[1] These focus attention on the problem of finding an equating measure which will be both sufficiently valid to guarantee fair conditions, and sufficiently economical of pupils' and teachers' time to render it practicably, as well as theoretically useful.

It is well known that speed of running is one of the most necessary qualities of a successful athlete in most sports. Other qualities are essential, too, so a simple running test may not be as broadly useful as a more general test. Nevertheless, running speed is so important that it was considered wise to check any equating device used by this criterion. Therefore, our first experiments were made with running races, and later with other sports.

In 1932 the Albany physical education staff planned a series of experiments designed to test out the utility of the Strength Index as the basis for grouping junior high school boys for competition in athletic activities. All pupils in the Albany schools above the sixth grade are given the Physical Fitness Test each year, so that Strength Indices for each boy and girl were readily available. The program called for experimentation with football, basketball, swimming, track and field, and ice skating. The first test was set up using certain indoor track activities. It was desired to test the procedure both for individual and for group effort. Hence we selected the fifty-meter dash and the shuttle relay. In the shuttle relay event each team consisted of eight boys with each boy running fifty meters. The boys running in the dash event were not to compete in the relay.

The next step was to determine just how the various competitive groupings were to be formed. After considerable experimentation, it was decided that equitable and convenient groupings would be secured by

[1] See the opening article of Part III of this supplement, and references there quoted.

using groups having a two hundred Strength Index point range. This was the basis for setting up the following divisions:

Group I	Strength Index under 850
Group II	Strength Index 850–1049
Group III	Strength Index 1050–1249
Group IV	Strength Index 1250 and up

As soon as the groupings had been determined the next step was to solicit entries. No limit was placed on the number of teams to be accepted in the relays. As plans for the meet progressed (the meet was conducted in connection with an annual indoor meet in the local armory) it became necessary, on account of a shortage of time, to restrict the fifty-meter dash to Group IV. After the entries had all been received, the meet was carefully organized in an effort to secure comparable conditions for all events. The same starter, finish judges, timers, and clerks were used for all events.

RESULTS OF THE FIFTY-METER SHUTTLE RELAY—FEBRUARY, 1933

S.I. Range	Group	Number of Teams	Number of Boys	Time of Winner
—— to 850	I	9	72	1 min., 7 sec.
850 to 1049	II	10	80	1 min., 4 sec.
1050 to 1249	III	6	48	1 min., flat
1250 to ——	IV	7	56	54⅗ sec.

These results showed a consistent improvement in the performance of the winning team as the Strength Index of the group went higher. The grouping plan used had been surprisingly successful in setting up groups which would include boys fairly equal in ability. Certainly none of the twenty-five teams in the first three groups would have won or placed had they competed in Group IV.

RESULTS OF THE FIFTY-METER DASH—FEBRUARY, 1933

Pupil	Strength Index	Strength Index Rank	Place in Trials	Place in Finals	Time Finals
Maffeo	2364	1	3	2	6⅘10
Liuzzi	2208	2	1	1	6⅖10
Di Lello	2149	5	2	0	
Hyman	1929	13	2	0	
Kelsey	1892	14	1	3	6⅘10
Timmons	1847	19	3	0	
Kolchetzski	1835	20	1	0	
Levy	1817	21	1	0	
Galloway	1798	22	2	0	
Luther	1704	26	2	0	
Lambert	1696	27	3	0	
Sax	1531	38	3	0	

A total of 41 boys competed in this event. In the final race the judges debated whether to award first place to Liuzzi or Maffeo, but finally declared Liuzzi the winner. This doubt in the minds of the judges indicates the closeness of the finish. It is interesting that the 2 boys, Liuzzi and Maffeo, having the highest Strength Index of the entire 41 boys, finished first and second in the finals. In the case of Kelsey, who ranked 14 in the Strength Index and finished third in the finals, evidently other factors overcame the handicap he had in strength.[2] Such factors might be running experience, skill in starting, or possibly a fortunate start in this race. An examination of the records of this group reveals that the Strength Index range was from 1453 to 2364 with a median of 1806.25. Eleven of the place winners, counting both trials and finals, were above this median, while only four were below it. In the finals all place winners were above the median.

The indoor track experiment was repeated in February, 1934, under the same conditions. The only changes made were that the fifty-meter dash was included for each group and the time of the first three places was recorded for each event.

RESULTS OF THE FIFTY-METER SHUTTLE RELAY—FEBRUARY, 1934

S.I. Range	Group	Number of Teams	Number of Boys	Recorded Time (Minutes, Seconds and Tenths) First	Second	Third
... to 849	I	8	64	1—13.4	(Not taken)	
850 to 1049	II	11	88	1—3	1—3.2	1—3.4
1050 to 1249	III	8	64	1—1.6	1—2.4	1—3.6
1250 to	IV	7	56	55 sec.	58 sec.	58.4 sec.

Here again, as in the 1933 test, the results show a consistent improvement in the performance of the winning team as the Strength Index of the group increased. Attention is directed particularly to the various times of these relays in the four groups. In all cases, except Group III, the time of the third place winner in the next higher classification is better than that of the first place winner in the preceding or next lower classification. In Group III the time of the second place winner is better than that of the first place winner in Group II.

These results clearly indicated an agreement with the conclusion of a year ago that the plan used was grouping runners to include boys fairly equal in ability. To test this finding still further, the average Strength Index for each team was computed. This was followed by a computation of the median Strength Index for the teams in each group.

[2] Readers should remember that no users or supporters of the S.I. as a measure of athletic ability imagine that it measures all of the factors which determine success. In fact, the generally accepted concept is that the S.I. measures accurately about half of these factors. Factors not measured directly or adequately (though correlations between these and S.I. are likely to be positive) are courage, cooperation, perseverance, initiative, experience, special skills, strategy, "competitive spirit," etc. (Ed.)

Using these data, the location of the place winners in each group in relation to the median of the group was recorded. The significance of this tabulation relates to the aim of "equalizing competition." If a great majority of winners in any race have S.I.'s above the median for their group, then the process of subdivision of participants into classes has not been accurate enough, and more classes with smaller S. I. range should be provided.

The results of the computations are given below:

		Above Median	*Below Median*
Group I	(only 3 places recorded)	2	1
II		2	2
III		2	2
IV		2	2

This analysis indicates that the range used for the groupings must be fairly accurate inasmuch as there was an even division between teams above and below the S. I. median for their group.

RESULTS OF THE FIFTY-METER DASH—FEBRUARY, 1934

Range	Group	Time in Seconds and Tenths		
		First	Second	Third
... to 849	I	7.6	7.8	8.
850 to 1049	II	7.1	7.3	7.4
1050 to 1249	III	7.	7.1	7.6
1250 to	IV	6.5	6.6	6.9

A total of 161 boys participated in this 50-meter dash in the 4 groups. Again the results showed a consistent improvement in the performance of the winners as the Strength Index of the group went higher.

A tabulation was also made of the place winners in each group in relation to the median of the group.

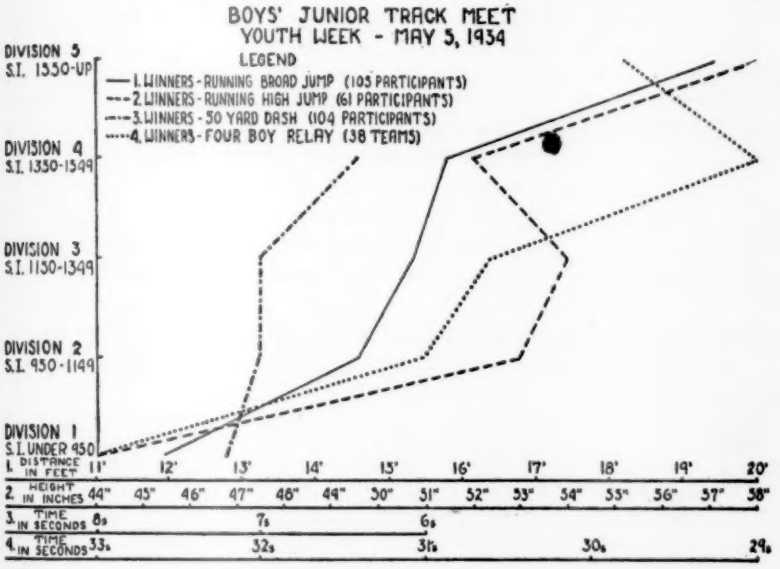
	Above Median	*Below Median*
Group I	9	10
II	9	10
III	11	5
IV	10	3

These figures included all place winners in both the trial and final heats. It is apparent from the above tabulation that the opportunity to win a place is approximately equal for a boy either above or below the median Strength Index of his group in all groups except Group IV. An examination of the records revealed that the actual Strength Index range in this group (1250 up) was from 1250 to 2196. Considering our previous results, it is almost certain that most of the place winners in any group with such a wide range will be found in the upper portion of the

group. This was what was actually found. These results indicate that equality of grouping will not be achieved if the range is greater than 200 Strength Index points. In our subsequent meets, therefore, possibly 6 groups will be provided in place of 4 used heretofore. This will enable us to include more boys in groups having a range of 200 points.

THE 1934 SPRING TRACK MEET

The first practical application of the experiments in track events was the 1934 track and field meet for junior high schools. This meet was conducted according to the general plans outlined for skating; and the results were approximately the same. Eligibility depended entirely


BOYS' JUNIOR TRACK MEET
YOUTH WEEK - MAY 5, 1934
LEGEND
1. WINNERS - RUNNING BROAD JUMP (105 PARTICIPANTS)
2. WINNERS - RUNNING HIGH JUMP (61 PARTICIPANTS)
3. WINNERS - 50 YARD DASH (104 PARTICIPANTS)
4. WINNERS - FOUR BOY RELAY (38 TEAMS)
DIVISION 5
S.I. 1350-UP
DIVISION 4
S.I. 1350-1349
DIVISION 3
S.I. 1150-1349
DIVISION 2
S.I. 950-1149
DIVISION 1
S.I. UNDER 950
1. DISTANCE IN FEET 11' 12' 13' 14' 15' 16' 17' 18' 19' 20'
2. HEIGHT IN INCHES 44" 45" 46" 47" 48" 49" 50" 51" 52" 53" 54" 55" 56" 57" 58"
3. TIME IN SECONDS 8s 7s 6s
4. TIME IN SECONDS 33s 32s 31s 30s 29s

upon a desire to compete. No prizes were given, no arguments raised, no criticisms offered by school principals. Educational consequences to participants seemed excellent—at least, the first rule of good sportsmanship, approximate equality between opponents, prevailed.

The reader should note a few outstanding facts revealed by the experiments. The analysis is given below:

1. There were 489 entries in this meet, which was run off in less than 2 hours.

2. Five S. I. classes were provided instead of four as in previous experiments. This number may be raised to six in 1935. (In skating eight classes are provided.)[3]

3. Whether the event be running, broad-jumping, or high-jumping, the 200 S. I. point range seems equally effective in determining medians and limits of performance. The reader should note the steadily increasing quality of performance with each S. I. level.

[3] See the report of skating on page 212.

4. The same peculiar variation in performance for the next-to-the-top level was apparent in the 1934 meet as in track experiments and in other sports.

5. Physical fitness tests were given by regular instructors as part of their physical education programs to determine needs and classify pupils for later physical education activities. The high correlations between ability in track events and S. I. levels thus establishes several other facts:

a) Pupils do not malinger in tests to secure lower S. I. classifications for sports.

b) Therefore physical directors are completely honest in testing.

c) And testing at Albany is highly objective as well as valid and reliable.

6. It is particularly significant to note that occasional errors are reflected in results of athletic events. Thus, the first 2 boys finishing in the Class I 50-yard dash had been improperly entered in a lower classification. After the race their unusual times were noted and a recheck of S. I.'s was made, thus disclosing the administrative error. The same incident occurred in the Class I 220-yard relay.

7. The effect on performance of changing conditions of participation is indicated by the time for Class V 220-yard relay. Had it been run on the same track as was used for other events, there is little doubt but that the time would have been nearly a second faster. This course was laid out so that runners ran in the opposite direction, encountering quite different conditions.

Equating Opponents in Swimming

By the Albany Physical Education Staff

THIS report summarizes the results of aquatic activities in the 1934 Youth Week in the Albany Public Schools, showing the relations between Strength Indices and speed in swimming races. The results effectively demonstrate the validity of the S. I. as a measure of swimming ability, for use in equalizing competition in schools. Both median and fastest times for the various S.I. levels show this.

THE PROGRAM

A group of junior high school instructors was asked to serve as the committee to outline aquatic activities for the Youth Week (formerly Boys' Week) program. Since the track program was to be organized on the selective basis of Strength Index, the same procedure was recommended for swimming. It was approved and accepted. Incidentally, as far as was known by the committee, no other city-wide swimming meet had yet been conducted on this basis.

The following Strength Index grouping was set up to control both track and swimming activities for that week:

Division One	Strength Indices under 950
Division Two	Strength Indices from 950 to 1149
Division Three	Strength Indices from 1150 to 1349
Division Four	Strength Indices from 1350 to 1549
Division Five	Strength Indices from 1550 upward

The events contested were:

Division One:
- 20-Yard Free Style
- Diving for Form (three dives)
- 20-Yard Back Stroke
- 80-Yard Relay

Division Two:
- 20-Yard Free Style
- Diving for Form (four dives)
- 20-Yard Back Stroke
- 80-Yard Relay

Division Three:
- 20-Yard Free Style
- Diving for Form (four dives)
- 20-Yard Back Stroke
- 80-Yard Relay

Division Four:
- 20-Yard Free Style
- Diving for Form (five dives)
- 20-Yard Back Stroke
- 40-Yard Free Style
- 80-Yard Relay

Division Five:
- 20-Yard Free Style
- Diving for Form (six dives)
- 40-Yard Back Stroke
- 160-Yard Free Style
- 80-Yard Relay

TIME RESULTS

The time performances in each division in the various races were as follows:

Style	Division	Median Time	Fastest Time
20-Yard Free Style	One	14.6	12.3
	Two	13.8	11.5
	Three	12.7	10.5
	Four	11.6	11.0
	Five	10.9	9.7
20-Yard Back Stroke	One	20.0	15.0
	Two	17.2	15.5
	Three	15.5	15.0
	Four	16.0	14.6

(The 20-yard back stroke was not contested in Division Five.)

Style	Division	Median Time	Fastest Time
80-Yard Relay	One	60.4	56.0
	Two	59.2	54.1
	Three		48.0
	Four	50.9	48.7
	Five	47.4	42.6

ANALYSIS

In computing the following statistical data, 102 places were taken into consideration. There were 43 different races or events. The average number of contestants in each race or event recorded was 4.4. The median Strength Index was computed for the contestants in each of the five divisions revealing the following facts:

1. Forty-four places were won by boys whose Strength Index was above the median Strength Index for all contestants in each particular race or event.

2. Forty-seven places were won by boys whose Strength Index was below the median Strength Index for all contestants in each particular race or event.

3. Eleven places were won by boys whose Strength Index was the same as the median Strength Index for all contestants in each particular race or event.

In percentages this shows that 43.2 per cent of the places were won by boys whose Strength Index was above the median; 46.0 per cent of the places by boys whose Strength Index was below the median; and 10.8 per cent of the places by boys whose Strength Index was the same as the median.

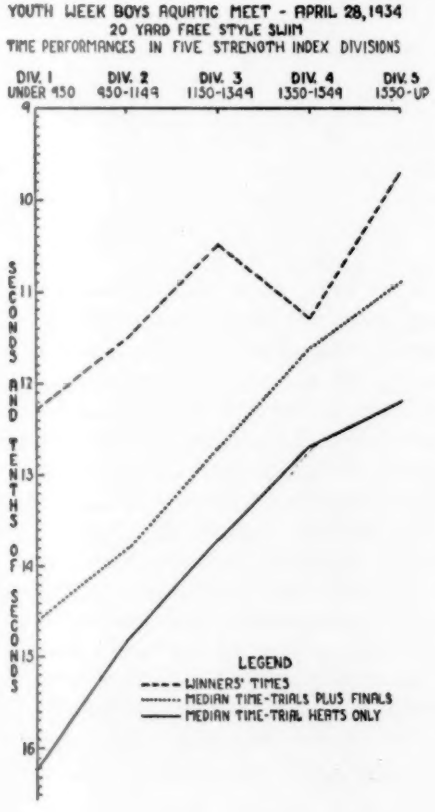
CONCLUSIONS

The findings here tend to show that in swimming strength has

an important bearing on winning. In previous analyses of swimming meets, in which a limitation of Strength Indices had not been imposed, it was ascertained that far too great a number of place winners were boys whose Strength Indices were above the median for the group. Limitation of space prevents the presentation of these former analyses.

In the results of the Youth Week meet, the place winners were about evenly divided above and below the medians for each particular group. The studies of track and skating have found this to be true also. In other words, when there is a selective basis of Strength Index, keeping all competitors within a very narrow S. I. range, the place winners tend to fall about evenly above and below the median. Furthermore, the attached chart indicates clearly the winner's time performance as well as the median time performance of the heat winners alone, and the heat winners plus the final winners in the twenty-yard free style swim. The median time performances improve with each higher classification.

In the light of these data, it is apparent that equality of competition may be obtained in intramural swimming by utilizing limited Strength Index ranges as the basis for grouping contestants.



Equating Opponents in Skating

By the Albany Physical Education Staff

THE POSSIBILITIES of conducting swimming, track, and skating meets according to the best educational theory are illustrated by procedures followed in Albany. This report outlines the conditions and results for 1933, 1934, and 1935 skating meets.

PLAN FOR CONDUCT OF MEETS

1. The key to the success of these meets (which attracted fewer than 100 actual participants before 1932, but 219 entries in 1933 and 437 entries in 1935) is the segregation of participants into 8 classes based on the Strength Index. The classes are as follows:

Under 750 S.I. points	1200-1349 S.I. points
750–899 S.I. points	1350-1499 S.I. points
900-1049 S.I. points	1500-1649 S.I. points
1050-1199 S.I. points	1650-above S.I. points

Scores from regular tests made in April-May of each year are used. The tests are given by regular instructors in each school, and are used primarily to classify pupils for physical education activities and to equalize competition in all sports conducted within each school.

2. Skating races are arranged in 8 classes for boys and 4 classes for girls. Races are in two distances—100-yard dash and 220-yard dash.

3. Both sexes participate in the same meet, though of course boys do not compete against the girls. The meet is usually run off in less than two hours, there being thirty different races including finals. Including each heat, about fifty actual races are skated. Of course, the participants in different classes do not compete with each other.

4. Pupils participating are excused from afternoon classes by special order of the superintendent of schools, on the principle that the meet is a proper "class activity." Pupils not participating are not excused: there is no "ballyhoo" or "build-up" for spectators.

5. All pupils in the city are eligible—from elementary school through the high school. There is no artificial eligibility by school or grade or academic record. Classification is according to Strength Index only. Thus it is not possible to use this event as a threat to force pupils to study in any other class—a proper arrangement, this, which should give pause to the usual academic eligibility rule maker. In Albany physical education and each other activity stands on its own feet. There is no more reason in disqualifying a pupil from participating in skating because his English is poor than in disqualifying him from participating in English because his skating is awkward!

6. No prizes of any description are given—whether cups, medals, banners, or even ribbons. *Pleasure of participation* is the all-sufficient "prize," which attracts more effectively than ribbons.

7. No team scores or school totals are computed. This innovation effectively checkmates one of the most valid criticisms of interschool participation on the junior high school level. Newspaper men would like to have these scores, but since the local school staff does not bother to make calculations, and since the computation would be decidedly involved, it is neglected by all!

8. The entire city physical education staff plans the meet under the guidance of the supervisory staff. Officials include the mayor as honorary referee, school officials, pupils, and interested laymen.

9. A complete program is mimeographed which includes the following items:

a) Entry forms.
b) List of officials.
c) Letter of authorization signed by the Director of Health Education and approved by the Superintendent of Schools.
d) Order of events.
e) Summary of results.
f) Complete official list of entries and heats to which they are assigned thus:

Event No. 2, Heat No. 1
Boys' 100-yard dash—750-899 S.I. points

Name	S.I.	School	Name	S.I.	School
1. Tibbetts, Edward	886	PS 16	7. Furlandi, Edward	844	PS 27
2. Heidrich, Fred	841	PS 18	8. Broadhurst, Wallace	895	L.J.H.S.
3. Rinaldi, Paul	844	PS 19	9. Schumacher, Jack	899	H.J.H.S.
4. Caldwell, William	842	PS 20	10. Hoffman, Edward	841	PS 20
5. Uhl, Edwin	809	PS 23	11. Kullman, Warren	897	PS 23
6. Weir, James	885	PS 26	12. Clothier, Alton	773	PS 26

10. Within a week following the meet, all records of winners, times, and other data are analyzed and reported to the Director of Health Education.

PUBLICITY

Formerly certain dailies questioned the absence of scoring, the classification of participants by S. I., the absence of prizes. However, the evident success of these meets, as measured by the numbers of participants and satisfaction of all concerned, has effectively eliminated adverse news comments.

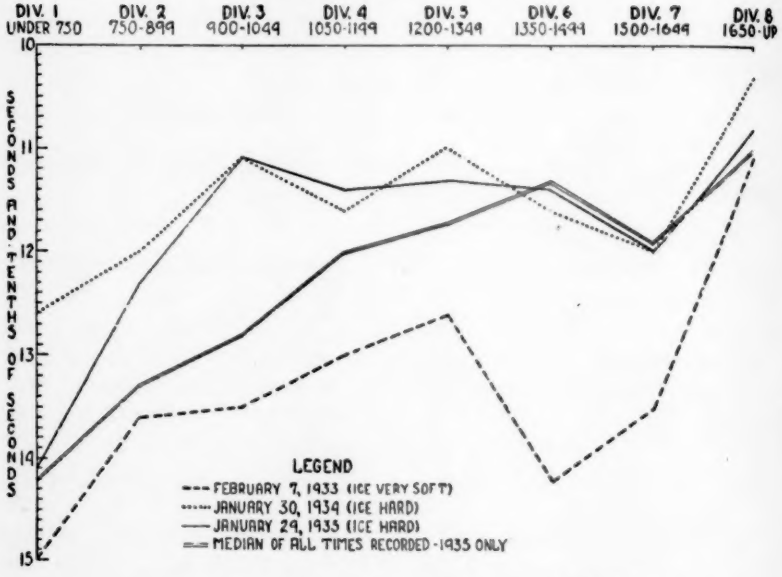
Newspapers now report the meet in advance and in detail, giving in full the list of events and entries—which often require several columns of print. The names of winners are also printed, but no "team scores" are included, for none are calculated. Critics of this procedure, who see in it a failure to develop "school loyalty," do not have the sympathy of Albany school principals who also see an end to competitive bickering, confusion, upset school routine, etc., in the new program. School loy-

alty, they observe, is developed more wholesomely and effectively by other means than "seeking to exalt the glory of ourselves by overwhelming our friends in sport."

As noted above, schools are not closed and spectators are not encouraged to attend. Of course spectators are welcome, and hundreds of parents and interested citizens attend these meets.

CHART I

BOYS' 100 YARD SKATING RACES
SHOWING TIME PERFORMANCE OF WINNERS IN 1933, 1934, 1935
AND THE MEDIAN TIME PERFORMANCE OF GROUPS IN 1935 ONLY
IN EIGHT STRENGTH INDEX DIVISIONS



EDUCATIONAL AND ADMINISTRATIVE RESULTS

The consequences of the new style of skating meet, which "equalizes competition," eliminates prizes, ignores school scores, neglects advertising ballyhoo, and brings together boys and girls from every grade above the sixth and every school building, include at least the following:

1. The numbers of participants have been more than quadrupled in four years. (In intramural basketball under the equality plan three hundred out of four hundred participate regularly and joyfully.)

2. The satisfactions of participants have been increased immeasurably. No skater feels beaten before he starts. If he loses, he knows he may win next time. He blames only himself for any failure, knowing his strength at least was equal to that of his opponents. If he wins, he is not unduly elated either—for he has achieved insight into the reasons for, and the tenuousness of, "victory." "Keeping a stout heart in

defeat and pride under, in victory" are merely silly phrases. "The game's the thing!"

3. All quarrelling over judges' decisions and bickering over prizes has ceased: the reasons therefore have been eliminated. The meet begins and ends in friendliness.

4. The meet is now accepted by superintendents, principals, and teachers as an intrinsically worth-while project—an educational experience.

5. All physical education teachers now think in terms of equalization. If strength is equalized, skill may be also. If not, the teacher knows that the deficiency is in skill or moral qualities and is led to correct deficiencies.

6. Conflicts between schools and physical education teachers have been eliminated. All work for the common good.

7. Parents endorse equalization, the meet, the entire physical education program, without reservation, for it provides every pupil in school with an opportunity to participate, to learn, to experience success as well as failure, to become more healthy and more social.

8. The physical educators of the city are giving a complete endorsement of every phase of equalization, non-scoring, and elimination of prizes. Most of them now press beyond minimum duties in testing, tabulation of records, analyzing of results, and requests for comments.

9. Principals now cooperate in very way, acting as officials, adapting their school programs to the needs of the meet and other special requests.

STATISTICAL RESULTS

1933.—In the 1933 meet, 16 different skating races were conducted, most of which of course involved several heats and a total of 186 participants. The S.I. classes were as indicated on page 214. In the 100-yard dash the winners' times for 8 classes were 15, 13.6, 13.5, 13, 12.6, 14.2, 13.5, 11.0. It is particularly interesting to note that the 1500-1649 S. I. point class was much slower than even the 1050-1199 class. This exception seems to run through the entire program of sports in which opponents are equalized in Albany. The only explanation so far offered is that this group happens to be in the full tide of adolescence and therefore is unusually erratic in physical functioning. However, no analysis in terms of pubescence has yet confirmed this hypothesis.

Observers gave the following analysis of the 1933 meet:

Leaving events 8 (100-yard dash for boys with S.I. above 1650) and 16 (220-yard dash for boys with S.I. above 1650) for separate consideration, because in these events the S.I. range is so great, we find that 20 boys above the median for their own group placed and 19 boys below the median placed. The average S.I. range for these 10 groups is 115.1.

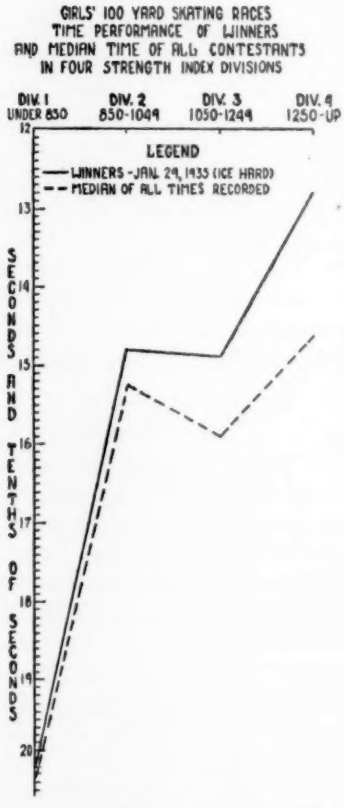
From this particular experiment, in which the range was no greater than 145 S.I. points, and the average range of these ten groups was 115.1, we found the opportunity for winning a place about equal for the boys whose S.I. was above or below the median for the particular group. At least the ratio was as 20 is to 19.

Consideration of events 8 and 16 discloses the following facts: The actual range for event No. 8 was 456 S.I. points, while for event No. 16, it was 649 or an average range of 552.5 points. Now in these two events 7 boys who won places in the races have an S.I. above the median and only 1 boy who rates below the median.

In the light of these facts we may conclude that a boy whose S.I. fell below the median had only about one chance in eight of winning a place in these events. Evidently a wide spread in range caused a much lessened opportunity for place winning for those below the median.

An examination of the time performances of winners of the various classifications in the 8 boys' 100-yard dashes strongly indicates that the higher the S.I., the better the time performance. This premise holds true for events numbering 1, 2, 3, 4, 5, and 8. In events 6 and 7 the time performance was not so good, but it must

CHART II



be noted that the number of participants in each of these events was less than the number engaged in any one of the other events.

A consideration of the time performances of the winners of the 4 boys' 220-yard dashes shows that in three of the four events, the higher the S.I., the better the time performance. In this case the premise is true for events 13, 15 and 16. The winner in event 14 gave a poorer time performance than the winner in event 13. It should be recalled, however, that the 220-yard dashes necessitated the making

of one turn during the races whereas all the 100-yard dashes were conducted on a straight-away track. Skill on the turns in skating races is a factor that cannot be ignored. But in spite of the part skill plays, we are still confronted with the fact that in three of the four 220-yard dashes for boys, the higher the S.I., the better the time performance.

1934.—In 1934 the skating meet experiment was repeated. One hundred eighty-seven entries actually skated on a very cold day. Again the times of winners in each class showed that the S. I. is a highly valid as well as a convenient measure of skating ability for boys and girls in their teens.

In the 8 classes for boys' 100-yard dash the times were 12.6, 12.0, 11.1, 11.6, 11.0, 11.6, 12.0, 10.3. For the boys' 220-yard dash, times were 26.2, 25.3, 26.0, 23.0. For the girls' 100-yard dash, they were 15., 14., 14.1, 13.8.

Observers' comments for this year were as follows:

In the boys' races we find that the classifications by narrowed Strength Index ranges resulted in twenty-one boys above the median for their classification winning places in the races while twenty-three boys below the median were place-winners. This result seems to indicate considerable success in equalizing competition.

Attention is directed to Event No. 8 (100-yard dash for boys) where the S.I. range was 1656–2009 and the median 1757.5 S.I. points. In this race all 4 place-winners were above the median. Last year we found 3 of the 4 place-winners in this class to be above the median S.I. for the class. Combining the results of the 2 years, we find 7 of the 8 place-winners were above the median.

In Event No. 16 (220-yard dash for boys) only 5 boys skated this year. Three place-winners were selected. The range was 1765-2009; the median was 1825. One boy above the median won a place and 2 boys below the median won places. Last year 10 boys skated in this event and all place-winners were above the median for the group. Combining the results of the 2 years we find 5 of the 7 place-winners were above the median S.I. for the group.

It would seem that a range difference of three hundred or more S.I. points is too great a handicap for equal opportunity to win a place in a skating meet. To state these facts in another way, it appears when any S.I. classification scheme consistently results in four-fifths of the place-winners being above the median S.I. for that group, that the classification is too broad for equalized competition. Unfortunately, the limited number of entries makes difficult further refinement of the S.I. range for this particular group.

Girls' Races

In the girls' events, Nos. 9, 10, and 11, we find three place-winners above the median and six place-winners below the median. Last year in these same events we had five place-winners above the median for each group and six place-winners below the median.

In event No. 12 with a range of 1264 to 1780 we find 2 place-winners above the median and one below. Last year the judges selected 4 place-winners and we had 3 above the median for that group and 1 below. For the 2 years the ratio is five to two.

It is, therefore, indicated, as in the case of the boys, that the S.I. range for the strongest group is too wide to insure equal competition in this grouping.

Time Performance

Time performances of the winners in both boys' and girls' races, while not con-

sistently better with each higher S.I. classification, nevertheless show a decided trend toward improvement in most of the classifications.

This year five of the eight and last year six of the eight winners in the boys' one hundred-yard dashes indicated time performance improvement as the S.I. classification went higher.

In the boys' 220-yard dashes this year 3 of the 4 winners turned in a bettered time performance with the higher S.I. classifications. Last year we found the same result.

This trend is further borne out by the results in the girls' one hundred-yard dashes for the two years. Each year 3 of the 4 place winners turned in improved time performances as the S.I. classification went to a higher level.

This cumulative evidence points decidedly toward the conclusion that the S.I. classification is equalizing the competition within certain ranges for even such a specialized activity as ice skating races, and should be further utilized until a better method of classification is discovered.

1935.—The 1935 skating meet attracted 294 participants.

Chart I indicates the relation between S.I. and times for various classes.

Equating Opponents in Intramural Track and Field Activities

By the ALBANY PHYSICAL EDUCATION STAFF

THE TENDENCY of junior high school physical education programs to concentrate on intramural activities raises the problem of classification. Obviously, homeroom, hobby, church affiliation, and other mental or social categories will not insure any reasonable degree of equality between opponents.

This report shows how the Strength Index may be used to equate opponents in intramural track and field events. Pupils in each school grade or homeroom may join forces by participating in events for individuals of their own S.I. level. Thus, the number of events or games (as in basketball) will be multiplied by the number of S.I. levels provided. Approximate equality will be guaranteed, which greatly enhances the attractiveness of the program, drawing many times more pupils into participation as well as providing a better controlled learning situation.

But is such a scheme *practicable?* The following report from an experiment conducted in the Philip Livingston Junior High School, Albany, New York, in 1934, is definite evidence of practicability, both in terms of equality and in terms of success in attracting and satisfying large numbers of pupils.

THE PLAN

1. One hundred forty-eight reported for the first track meeting. The group was divided into six divisions based on the S.I. derived from tests made in March. The meets were conducted in April, May and June.

TABLE I

Classes	*S.I. Range*	*Number of Pupils*
Division I	Under 950	14
Division II	950 — 1149	29
Division III	1150 — 1349	22
Division IV	1350 — 1549	22
Division V	1550 — 1749	29
Division VI	1750 and over	32

2. These six divisions having been made, they were further divided into four teams, each team having an equal number of members from each of the six divisions. The teams then selected the names: "Harvard," "Yale," "Army," and "Navy" and captains were elected.

To illustrate the procedure the complete roster of the "Harvard" team is given in Table II.

TABLE II
TEAM LIST INTRAMURAL TRACK LEAGUE
Harvard—E. Timmons, Capt.

Division I	Grade	S.I.
1. R. Gomez	9	863
2. F. Caenssley	7	826
3. W. Broadhurst	7	855
Division II		
1. J. Dorsey	9	1149
2. R. Vogel	7	1049
3. D. Bucci	9	980
4. T. Small	8	973
5. J. Van Wormer	7	1118
6. W. Hoyt	7	950
7. S. Vasiewicz	7	1140
Division III		
1. J. Tortorice	8	1308
2. E. Nicklas	7	1156
3. R. Rosenberg	8	1305
4. W. Boule	8	1243
5. V. Fake	9	1224
6. E. Barnett	9	1316

Division IV	Grade	S.I.
1. F. Cameron	8	1377
2. E. Larkin	9	1507
3. L. Collier	7	1456
4. S. Myers	7	1500
5. J. Ornoski	9	1485
Division V		
1. J. Heinz	9	1680
2. F. Day	9	1612
3. M. Diamond	9	1593
4. A. Adams	9	1604
5. F. Bartholemew	8	1566
6. J. Jimpson	8	1580
7. C. Swirzcky	9	1688
8. J. Drzsmala	9	1730
Division VI		
1. E. Timmons	9	1680
2. G. Promiscuo	9	2050
3. H. Wickert	9	2706
4. I. Cornall	7	1807
5. C. Pollay	9	2171
6. W. Goldwine	8	1839
7. A. Linett	9	1798
8. W. Lindheimer	9	2152

3. A group of events was then selected for each S.I. division, the events being selected to conform to the capacity of participants.

TABLE III
EVENTS USED IN VARIOUS DIVISIONS

Events	Divisions					
	1	2	3	4	5	6
1. 75-Yard Dash	x	x	x	x	x	x
2. 100-Yard Dash				x	x	x
3. 220-Yard Dash				x	x	x
4. 880-Yard Run					x	x
5. 8-Lb. Shot Put				x	x	x
6. Pole Vault				x	x	x
7. Running High Jump	x	x	x	x	x	x
8. Running Broad Jump	x	x	x	x	x	x

4. Each member of the squad was permitted to participate in one track and two field events in his respective division.

5. A league schedule was then prepared for the four teams. When two teams met, the six divisions on one team competed with the six corresponding divisions of the other team, i.e.:

Division 1 of Harvard vs. Division 1 of Yale
Division 2 of Harvard vs. Division 2 of Yale

6. Points were awarded for the first four places (5-3-2-1) and points for all the events in all six divisions were added for each total team score. This plan made possible three days of meets for each week. Each team competed in two meets a week.

7. Practice sessions were held for the entire group over a three-week period prior to the first meet, which was conducted on April 25.

GENERAL RESULTS

1. Eight days were set aside for meets and 20 days for practices. Starting with an original registration of 148 boys there was an aggregate attendance of 2133 boys and a daily average of 58 boys. Six league meets were held, one All-Team Meet, and one Youth Week Meet. One hundred sixty-eight boys competed in the All-Team Meet and 147 boys in the Youth Week Meet.

2. Eighty-four different boys enjoyed the satisfaction of winning first places.

3. The method employed in this intramural set-up of equalizing opponents, providing for team loyalties, practice periods, the formality of "real meets" and for multiplying opportunities for success, practically guaranteed each participant an equal opportunity to achieve a place in one or more meets and to enjoy himself in participation.

4. A great amount of team loyalty was present throughout all the divisions. It was a common experience to see and hear youngsters from divisions 1 or 2 on one team cheering and encouraging their team members up in division 6.

5. An increasing interest is indicated by the consistency of the attendance records. *There were more boys participating in the last few meets than in the first two meets.* This is contrary to the experience of most intramural directors, who have been led to expect a falling-away of interest as the season progresses.

6. Each team competed with the other three teams once. At the termination of the league, an All-Team Meet was held at Ridgefield Park on June 1. This final intramural meet was open to anyone who desired to enter and it became necessary to add an additional team, totaling five in all.

7. The league was tremendously popular with and gratifying to a great number of boys.

8. An interesting sidelight of this league is the fact that the winners of many events in one meet did not win the next meet. In the All-Team

Meet two undefeated boys were defeated by comparative unknowns in our school track work.

STATISTICAL ANALYSIS

1. A complete analysis was prepared for place winners giving times and S.I. Table IV is but one of twenty-three such analyses. It is reproduced here to illustrate the procedure followed and the facts revealed in the competition.

TABLE IV
DIVISION II—950–1149
75-YARD DASH

Meet	*First Place* S.I.	Time	*Second Place* S.I.	Time	*Third Place* S.I.	Time	*Fourth Place* S.I.	Time
1	1043	10.	1112	10.3	980	10.4	1094	11.1
2	1126	10.1	1119	10.2	1084	10.3	1088	10.4
3	1140	12.1	1052	12.2	959	12.7	980	13.4
4	1119	10.	1112	10.2	1093	11.	1093	11.6
5	1126	9.4	1119	10.2	1107	10.4	1049	10.5
6	1093	10.2	1058	10.8	959	11.	....	...

DISTRIBUTION OF PLACE WINNERS WITH REFERENCE TO MEDIAN S.I. OF ALL PERFORMERS IN DIVISION II—75-YARD DASH (SIX MEETS)
Median = 1053 (45 cases)

Place	*Above Median S.I.*	*Below Median S.I.*
First	5	1
Second	5	1
Third	3	3
Fourth	4	1

2. The times and distances for the various events are reported in Table V. It is interesting to note (*a*) how regularly records improve with each higher S.I. level and (*b*) the curious break away from regular improvement in performance for higher S.I. groups in Division 5. This break occurs throughout the Albany studies and will be the subject of a searching study during the next three years.

TABLE V
ANALYSIS OF EVENTS—SIX DIVISIONS
All-Team Meet, June 1, 1934
75-YARD DASH

Division	Number Contestants	Winner's Time	Median Performance of all	Median S.I.	Place Winners above S.I. median	Place Winners below S.I. median
1	9	10.3	10.7	856	3	1
2	23	9.7	10.7	1058	4	0
3	26	9.4	10.2	1233	4	0
4	17	9.0	9.6	1462	2	2
5	15	9.1	10.0	1599	2	2
6	13	8.4	8.8	2054	3	1

BROAD JUMP

Division	Number Contestants	Winner's Distance	Median Performance of all	Median S.I.	Place Winners above S.I. median	Place Winners below S.I. median
1	9	12′9″	10′8½″	856	2	2
2	14	13′2″	11′11″	1055	4	0
3	19	13′11½″	12′8″	1227	2	2
4	12	15′9″	13′5″	1470	3	1
5	17	16′	13′5½″	1608	3	1
6	9	16′11¼″	14′11½″	2054	2	2

HIGH JUMP

Division	Number Contestants	Winner's Height	Median Performance of all	Median S.I.	Place Winners above S.I. median	Place Winners below S.I. median
1	4	3′9″	3′5½″	859	2	2
2	14	4′2″	3′7″	1050	5	1
3	19	4′10″	4′5″	1239	4	5
4	12	4′5″	4′2″	1490	3	2
5	9	4′3″	4′2″	1584	4	2
6	7	5′3¼″	4′10″	2199	3	1

8-POUND SHOT PUT

Division	Number Contestants	Winner's Put	Median Performance of all	Median S.I.	Place Winners above S.I. median	Place Winners below S.I. median
4	7	32′5½″	27′11″	1462	2	2
5	9	31′5″	29′11″	1637	2	2
6	13	40′½″	31′7″	2004	3	1

100-YARD DASH

Division	Number Contestants	Winner's Time	Median Performance of all	Median S.I.	Place Winners above S.I. median	Place Winners below S.I. median
3	7	12.5	12.7	1308	3	1
4	7	11.7	12.4	1485	2	2
5	12	11.8	12.4	1603	1	3
6	7	11.1	11.4	1969	2	2

220-YARD DASH

Division	Number Contestants	Winner's Time	Median Performance of all	Median S.I.	Place Winners above S.I. median	Place Winners below S.I. median
5	7	27.7	28.3	1616	3	1
6	5	25.8	25.9	2055	2	1

880-YARD RUN

Division	Number Contestants	Winner's Time	Median Performance of all	Median S.I.	Place Winners above S.I. median	Place Winners below S.I. median
5	7	2.18.9	2.31.5	1612	2	2
6	9	2.17.7	2.26	2052	3	1

3. The possibility of a 200 point S.I. range securing equality of opportunity for participants on various levels is shown by Table VI which indicates the distribution of place winners with S.I.'s above and below the median for their Division in each event.

TABLE VI

DISTRIBUTION OF PLACE WINNERS IN EACH EVENT IN RELATION TO THE MEDIAN STRENGTH INDEX OF THE GROUP IN WHICH THEY COMPETED

Event	*Place Winners Above Median S.I.*	*Place Winners Below Median S.I.*
75-Yard Dash	79	55
100-Yard Dash	15	15
220-Yard Dash	11	6
880-Yard Run	21	14
Broad Jump	78	65
High Jump	59	48
8-Lb. Shot Put	23	20
Totals	286	223

4. The advisability of allowing junior high school boys to compete in the half-mile run was questioned. It was decided to restrict entries for this event and conduct a special study of all boys accepted. Only those boys (*a*) in S.I. Division 5 or 6, (*b*) at least fourteen years of age, and (*c*) with a good health record were accepted. These boys carried on a program of careful training and ran in the event as listed in the various meets.

Tests administered in March and again at the end of the season failed to disclose any significant changes. Further experiments concerning the use of the half-mile for junior high school boys are desirable and will be made.

SUMMARY

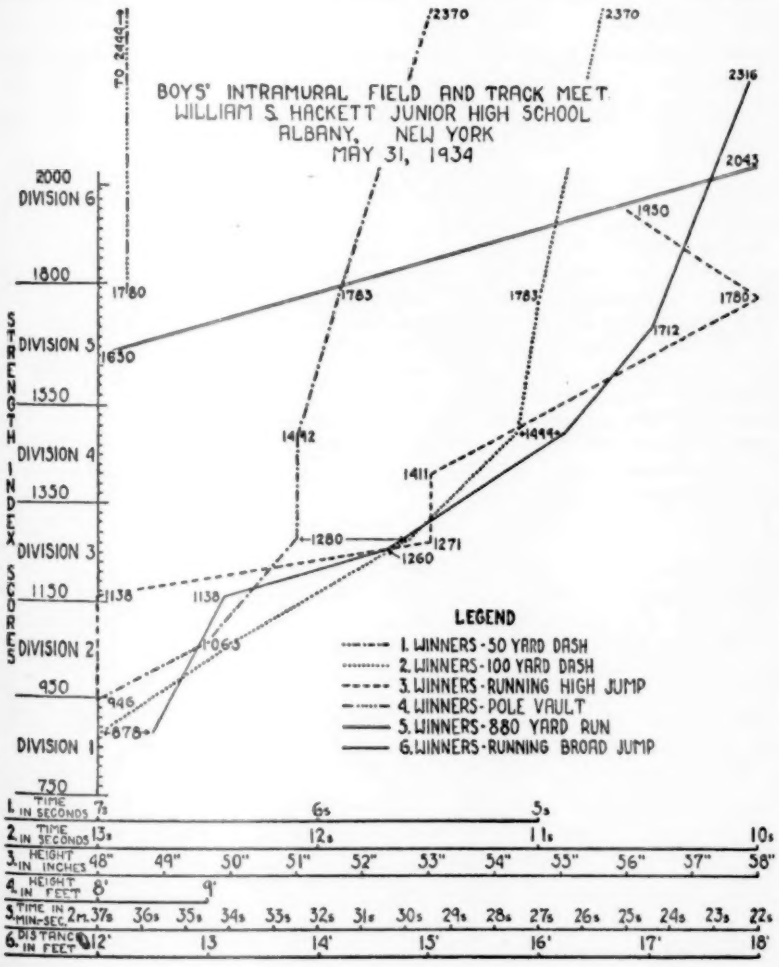
1. The program appealed to large numbers as is indicated by the attendance record.

2. The degree of interest increased as the season progressed. This is indicated by the continual increase in attendance.

3. The division of the boys into six groups and the redivision into four teams seemed to influence favorably the interest and attendance.

4. The propriety of the two-hundred-point range in each Division except the sixth is corroborated by the results indicated in Table VI.

5. The necessity for S.I. (or some other better) divisions and groupings is clearly indicated by the charts which show the progressive step-up in the results of all the events. These seem conclusively to prove that



directors of intramural sports ought not, in fairness to participants, or in hope of holding participants' interest, to call upon a group of individuals of high strength indices to compete with a group having much lower S.I. scores.

6. This grouping plan which utilized the Strength Index proved to be highly valid. The results obtained indicate that intramural track should be administered on the same plan in the future.

All of the foregoing data refer to the use of the plan in the Livingston Junior High School. The same plan was in operation at the William S. Hackett Junior High School as previously outlined, producing practically the same findings as noted for the Livingston School.

The following brief summary indicates some of the results in the Hackett Junior High School and is offered for the purpose of comparing the findings in the two schools. It is significant to point out that all testing, grouping, and classifying of pupils as well as the actual conduct of the meets was carried on by a different set of instructors. The fact that the findings agree so closely would seem to indicate a rather high validity for the plan.

SUMMARY OF INTRAMURAL TRACK AND FIELD ACTIVITIES
William S. Hackett Junior High School, 1934

Number of teams	4
Number of meets	8
Number participating in at least 1 meet	189
Number participating in at least 2 meets	171
Number of boys in school who were free to participate in after school program	522
Number participating in track	189
Percentage of boys participating in track	36%
Number of relay teams taking part in meets	68
Number of boys who took first place in at least 1 event	82
Number of boys who placed in at least 1 event	130

The following chart indicates the number of boys entered in each event in groups through the season.

	Divisions					
	1	2	3	4	5	6
50-yard dash	39	49	44	41	25	31
100-yard dash	44	35	34	33	26	33
High jump	37	40	27	27	25	24
Broad jump	45	57	47	40	31	47
½ mile					24	28
Shot put					22	43
Pole vault					8	21

Attendance at the meets:

No. 1	50	No. 5	58
No. 2	62	No. 6	63
No. 3	68	No. 7	181
No. 4	70	No. 8	47

ARMORY MEET

Number participating	140

BOYS' WEEK MEET

Number participating	150

Part IV

Omnibus

Mens sana in corpore sano

Is Physical Fitness Testing Adaptable to Y.M.C.A. Physical Education Programs?

By Robert E. Laveaga

NO ATTEMPT is made in this report to present a comprehensive research document. Such a report can only result after several years of experimentation.

Realizing, however, that the directorship in the Y.M.C.A. field is interested in learning of experimentations in testing, the writer presents the following material with a hope that it will motivate readers to search for and experiment with testing programs. The writer has observed several such programs in his own building during the past few months. This paper, therefore, reports each briefly, with comments on their apparent values and outcomes.

The following are reported:

I. Observations from three groups of college students: Northeastern University freshmen, Harvard dental freshmen, and Boston Optical College students.

II. Observations from tests given to members of the local Y.M.C.A.

III. Observations on techniques.

IV. Recommendations.

COLLEGE STUDENT TESTS

Northeastern University Freshmen.—Having the responsibility for the physical education program of the freshmen of Northeastern University, the writer recommended to Mr. Donald MacKenzie, a graduate student at Boston University, and also a member of the Northeastern faculty, that he write his thesis on the results of a series of tests with the entering freshman class at Northeastern University. The suggestion was accepted and the tests were given to 332 students in September, 1934.

The P.F.I. testing program was used, which so clearly gives a person a significant Index of Physical Fitness that it attracts the active interest of boys and men of all ages.

In the Northeastern University study, over three hundred freshmen were easily examined in three periods of about two hours each. This included a physical examination by a medical staff with assistants and about twenty men giving the tests. Two complete sets of testing apparatus were used.

Compared to previous experiences in examining the freshmen, it was noted that there seemed to be much more interest in the total examination than previously. The young men sensed that they were doing something which would in turn give them something tangible. The medical examiner's report of necessity leaves the layman with questions as to the exact meaning of "good," "fair," or "poor" for any particular part of the body. But when a young man is given a Physical Fitness Index of 65, he knows that he is far below par. (A P.F.I. below 80 is poor. When a person has a P.F.I. higher than 120, his physical education program should not be disturbed; when higher than 140, he should be cautioned, for he is getting "too fine.")

The men receiving P.F.I.'s below 80 were called back for special attention by medical examiners and special prescriptions of exercise were given them. (This same procedure was followed through with two other University groups, the Harvard dental freshmen and the Boston Optical College students. The retests on these two groups are about to be made.)

After testing was completed each freshman chose an activity, in which he participated twice weekly for six weeks, when he was retested. The freshmen at Northeastern are permitted to choose either the gymnasium program, football, cross-country, track, or wrestling for their physical education program. Men who cannot swim must report to the natatorium for this instruction.

The statistics summarizing the results of the first two tests are reported by MacKenzie.[1]

Several interesting observations should be made concerning this experiment.

1. The most significant is the surprising increase in fitness of men after the six-week program of activities, from the initial very high average P.F.I. of 106.2 in September to 111.6 in November. Undoubtedly this group of students would compare favorably with any other in the country. Their work at Northeastern, including study and all activities, apparently is of such a nature that the individual is able to maintain and improve his general health index. (The general rule is for college students to lose from 2 to 3 P.F.I. points each semester during the first year or two of college life.) One raises the question of just what will happen during the five years which follow when these students are left to pursue their own desires for physical exercise. The writer will endeavor to follow fifty of these young men through their college experience.

2. The increase in fitness of the low P.F.I.'s is worthy of attention. These men, eleven in number, increased nearly 10 per cent in less than two months between the tests. A study of each case would reveal that

[1] Pages 125–143.

the time given, and the work required for testing were worth while *for these cases alone*. Testing is of especial value to the individual whose index of physical fitness is low.

3. Football seems not to be very beneficial to those participating in it for this group was the only one to register a drop in the P.F.I. The leg strength of this group increased greatly but the arm strength dropped, while weight increased steadily; fat was put on, but was not converted into effective muscle tissue. However, as the second tests of this group were made three days after the final game, the players may have been "stale."

4. Students in the regular gymnasium classes with the so-called formal program, (so much under-rated) totaled a surprising increase going from 110.6 to 116.8. When one realizes that the average P.F.I. for college freshmen is between 90 and 95, the foregoing figures present a very gratifying report.

5. Track, with a beginning figure of 106.1 showed an increase to 113. However, the drop of .2 in lung capacity is difficult to explain especially with track men. (The lung capacity test is the only one which registered a loss for the entire group.)

6. Many students have been motivated to take an interest in their general health and to use these tests as a means of keeping account of their general condition. For the first time the department is ready to give a significant report on the progress of the members of the physical education program to the Association Secretary and Board.

Harvard Dental Freshmen.—Thirty-two students at the Harvard Dental School completed the tests in November. To date no retest has been given. The ranges of the items of the test may be of interest:

RANGES

Measures	Lowest	Highest	Mean
Age, years and months	19–2	25–4	22 yrs. 6 mo.
Weight, pounds	117	182	147.9
Height, inches	64.3	74	68.7
Arm strength, points	56	899	369
Leg lift, pounds	390	860	581
Back lift, pounds	320	590	461
Left grip, pounds	82	142	103
Right grip, pounds	80	158	117
Vital capacity, cu. in.	212	322	266
Strength index	1335	2669	1901
Norm	1557	2773	2013
P.F.I.	74	130	90

The arithmetical mean for the group was a P.F.I. of 90. The retests should show a substantial increase, as the students are participating in the present program with much enthusiasm.

Boston Optical College.—Fifty-six students reported for the tests early in October. The median P.F.I. of the group was 100, while the frequency distribution is as follows:

P.F.I. Frequency Distribution

P.F.I.	*Cases*
130 to 139	1
120 to 129	7
110 to 119	14
100 to 109	6
90 to 99	12
80 to 89	5
70 to 79	6
60 to 69	1
50 to 59	4

Retests have not been given to the above two groups which means that the value to date of their physical education program is as yet unknown. This is one of the strong points in favor of the measurement program. It stimulates instructors to perform to the best of their ability for they know that they, as well as students, are "checked-up" when retests are given.

OBSERVATIONS FROM TESTS GIVEN TO MEMBERS OF THE Y.M.C.A.

1. About one hundred tests have been given to senior members of the Y.M.C.A. and another hundred to boys. After experimenting for four months with the above men and boys there is no doubt at all of the value of this measurement procedure for the Y.M.C.A. The testing program will become increasingly valuable to the Association when it is incorporated and perfected as a regular part of the "Y" health program.

2. The chief value of testing seems to be that we can show by these tests whether a member is making progress or failing to do so. The results of the health examination do not, in most cases satisfy members; but when they have gone through the strength tests and have secured their indices, they have definite starting places from which to measure progress. Certain very interesting supervised work has been made possible by the tests: for example, a man with weak grip strength was given a series of exercises to build up the weak part. His active cooperation was secured, with the following results:

Date	*Right grip*	*Left grip*
10–23	105	108
11–1	106	115
11–15	110	117
11–20	114	120
11–27	114	130
12–4	122	128
12–16	125	135

3. By repeating the grip test at frequent intervals one is able to observe fairly accurately the progress or loss of general health. The complete test is given about every three or four months.

4. The testing program furnishes an opportunity for a quality program of real educational significance. Knowing exactly where a man's weakness is, the director is able to prescribe immediately the correct procedure rather than taking a chance with "gun-shot methods."

Tests are thus a valuable aid in helping to hold members. This value in itself is very great to Y.M.C.A. organizations, particularly in these days of increased recreational facilities.

TECHNIQUES

1. In the Young Men's Christian Association one is faced with the problem of insufficient help, which in some places, might render testing a burden. However, the answer to this difficulty is found in the keynote of the Association Movement, namely, "Service." Members and others respond eagerly to requests for help in the testing program. Often they are college students desiring experience in measurement procedure or school teachers interested in the field of measurement and physical education. Many other association members are test-minded and enjoy this type of volunteer service.

2. A second problem is that of financing the purchase of equipment. Many, in fact most, Associations have a spirometer, a set of parallel bars, and a set of flying rings. This leaves the hand dynamometer and the back and leg dynamometer to be purchased. The two can be bought for less than $150.00. When the value and the long life of these instruments are recalled it should not take a great deal of "selling the idea" to secure the apparatus.

3. Two convenient methods may be used for giving the tests: the first, which is similar to the battery-type tests given to the college students, when all report at certain times. Many examiners are pressed into service and are able to test a large number of men in any one evening. The second procedure is to have each member take the test immediately following his physical examination. If this is possible it is by far the most efficient method. The doctor or physical director making the health examination can conduct P.F.I. tests also, or can turn the member over to some regularly detailed tester.

4. If an Association has the club plan of organization, there is no better way to have the members of the club realize the significance of health than to have them brought to the gymnasium in a group and given the test. This will open plenty of doors for opportunity to talk with these boys and young men on questions of health.

RECOMMENDATIONS

1. That the Young Men's Christian Association study and experiment with this testing program as a way of enriching the work of the health education department, as offering a guide-post to members who are interested in health, and as a highly effective method of securing and holding members.

2. That no tests be given without previous medical examination of individuals and the approval of the physician.

3. That the tests be used to check a man against himself and not for the sake of comparing him with others. It is not competition we want but an individual and private analysis. If it becomes competitive then the value of the tests is materially reduced.

Evaluation of Certain Phases of a Junior College Physical Education Program

By V. F. Hernlund and N. G. Barfield

PURPOSES

THE PURPOSE of this study was to evaluate the program of physical education at the Emory Junior College and Academy at Oxford, Georgia, to determine: (1) the value of present practices and if necessary, point to needed changes; (2) student reactions to certain principles applied in the program; (3) future policies, in the light of discoveries; and (4) to provide an objective and authoritative basis for recommending programs to other schools seeking information.

CONDITIONS

Emory Junior College and Academy shares the conviction of the Mother Institution, Emory University, that physical education should be made available to all students and conducted in the most wholesome spirit. Physical education is regarded as a genuine branch of education. Emory Junior College and Academy attempts to provide every student with an adequate opportunity to develop educationally, physically, socially, and in growth of character, through active participation in individual and group athletic activities. With the students organized into three competing groups it is possible to carry on these activities in a way not unlike varsity athletics in other institutions, from the standpoint of seasons, training, and instruction.

So that all students might gain the benefits of sports, an intramural system was worked out for Emory University Academy immediately following the removal of Emory University from Oxford to Atlanta in 1920. Mr. E. J. Brown was directly responsible for the organization and plan of administration in practice when one of the authors first came in contact with the program in 1929. Much of the original idea remains, but in matters of emphasis and detail of promotion many radical changes have been made.

During 1931–32 the response to the program of athletic activities has obviously been better than at any previous time. This observation is supported by the greater percentage of entries in tournaments, by more faithful attendance at sport practice periods, and by a decreased number of students failing to earn credit in physical education.

At Emory Junior College and Academy the student body is divided into three units or "companies" for the purpose of individual and group

competition in athletic activities. These groups are designated as companies A, B, and C. The number of boys enrolled for 1931–32 was 143.

During the first two weeks of the school session the physical director checks over the lists of former students to determine the number enrolled who are already members of the three companies. In 1931–32 the new members were allowed to draw, on the basis of weight, for membership in a company. Drawings are made irrespective of physical or academic classification.

The sports and activities engaged in during the year may be grouped in the following manner:

Fall	*Winter*	*Spring*	*Year Round*
Football	Basketball	Baseball	Track and Field
Cross-Country	Volleyball	Track and Field	Tennis
Tennis	Speedball	Tennis	Handball
Handball	Wrestling	Speedball	Gymnastics
Diamondball	Boxing	Swimming	
Swimming	Tennis	Handball	
Gym Classes	Gym Classes	Gym Classes	
	Handball		

A SPECIAL INCENTIVE

Even though the wide variety of sports and activities listed above aids to a great extent in drawing out student interest, the director of physical education felt that an additional incentive might further insure the success of the new program. Accordingly, in 1930 a point system was devised to "reward" both individuals and groups. The awarding of points seemed to provide that needed further incentive for a certain class of students who require a little coaxing to engage voluntarily in the physical education program.

The statements listed below serve to present in a concise form the essential features of the scoring system.

1. Points are awarded for the practice of a sport. A practice period must be "for at least sixty minutes" to earn points.
2. Points are awarded to individuals on both winning and losing teams engaged in a contest.
3. Points are not awarded to a team or group except as they are earned by individuals.
4. Points may be received in not more than two sports in any one day.
5. Points are earned by meeting the required classes in physical education.
6. Students are honor-bound to report honestly the points earned.
7. The Company Cup is awarded each year to the company which has totaled the highest number of points.
8. The individual student earning the greatest number of points during the year is awarded a medal designating him as such.
9. The five students having the next highest scores are awarded regulation school monograms.
10. Student company secretaries keep records of the participation of company's members.
11. Permanent individual scores are kept on file in the office of the Director of Physical Education.

12. Company standings are represented graphically each week.

13. Monograms are awarded in football, basketball, baseball, track, tennis, and gymnastics upon compliance with the requirements for earning a letter in that sport.

To reduce the recording work to a minimum, individual daily scores are reported on weekly score cards. A permanent individual record card has been devised to which the student's weekly score is transferred. The recording is simple and student assistants can easily attend to this task each week.

AN EXCLUSIVELY INTRAMURAL PROGRAM OF COMPETITION

Every student receives instruction in the different activities he elects and sufficient opportunities to practice and play with his team. Organization of teams with this point in view is so managed that "winning" in actual contests is not regarded as the sole aim. Coaches encourage team members to put forth their best efforts, but they also take advantage of opportunities which arise in contests to call attention to points of fair and foul play and sportsmanship.

The type of physical education program under consideration in this study makes it altogether unnecessary to have competition with other schools. There may be some disadvantages of a sports program confined to the home campus; but from past experience in observing the functioning of the whole program toward the objectives held for it, these disadvantages seem to be far outweighed by its desirable features.

The advantages and disadvantages of this program are not the subject of this paper. It deals exclusively with the problems of classification and incentives. We wished particularly to investigate (*a*) our method of selecting students for companies, (*b*) our guidance of individuals in their activities, and (*c*) the propriety of our special system of incentives.

INQUIRIES

1. *What physical differences existed between the three companies?* An answer was sought using the P.F.I. as the physical measure which most significantly measures physical powers. One hundred students were tested with the following results:

TABLE I

P.F.I. Interval	*P.F.I. Distribution Cases*
115 to ...	12
100 to 114	39
85 to 99	40
... to 84	9

The distribution of P.F.I.'s by companies shows how variable were students in each company in terms of physical powers to engage and persevere in activities.

Table II reveals two significant facts. First, the companies varied

considerably in physical powers, company A being 7 per cent better off *on the average* than its opponents in both S.I. and P.F.I.

Second, the company winning the largest number of points was not the one most favored physically. Evidently some other factor contributed to its total activity. This fact is further established by the data reported in Table III.

TABLE II
AVERAGE AND TOTAL SCORES BY COMPANIES

Company	Average S.I.	Average P.F.I.	Total Company Score in Activities
A	1817	104	5505
B	1650	97	6209
C	1672	98	4301

TABLE III
PHYSICAL FITNESS INDEX DISTRIBUTION COMPARED FOR COMPANIES A, B, C

	A		B		C	
Distribution	f	%	f	%	f	%
115 – up	7	21.9	1	2.9	4	11.7
100 – 114	13	40.6	15	44.4	11	32.2
85 – 99	12	37.5	13	38.1	15	44.4
84 – down	..	...	5	14.6	4	11.7
Total	32	100.0	34	100.0	34	100.0
Mean P.F.I.	104.2		97		98.3	

Now, it is desirable to have the companies begin the year with practically the same average S.I. and P.F.I., for equality between opponents is a first condition of fair play.[1] As the season progresses and improvement is made the groups will necessarily vary from the totals with which they started; but by consideration of the activity up to that point, equalization may be maintained by the proper assignment of incoming students late in the year.

But it has been revealed here that the system of selecting students for the various companies does not equate opponents, and therefore ought to be modified to guarantee at least an equalization of physical powers between competitors.

2. *Is there any relation between physical powers as measured by P.F.I. and the response of students to the activity program?*

We noted above that the strongest company did not win the cup. But perhaps some unique plan of attack accounted for the victory,

[1] To say nothing of its importance in insuring interest in, and the success of, any intramural activity program. See Part III of this Supplement. (Ed.)

rather than superior physical power, which B company obviously lacked.

This problem was attacked, first, by segregating the scores of the ten students who were average, lowest, and highest in activity scores and determining their average P.F.I.'s.

The results are summarized in Table IV.

TABLE IV
AVERAGE SCORES OF VARIOUS GROUPS

Group	Average Activity Score	Average S.I.	Average P.F.I.
Highest 10	473	1868	107
Middle 10	168	1828	103
Lowest 10	36	1440	87

The authors consider this evidence of correlation between activity scores and P.F.I.'s to be very significant. Evidently the relation between P.F.I. and activity is positive and high in spite of the fact that a company with less than the highest average won the cup.

3. *Then why did B company win the largest number of activity points?*

The authors are confident that internal organization and leadership were the deciding factors. B company is organized within itself into eight small groups. These groups competed with each other in earning points from week to week throughout the year. Because of this incentive they were more careful to report every point earned than were the members of A and C companies who had no such inner organization. The authors are convinced that this explanation is adequate to account for the variation from the established principle. If A company had been organized within as B was, we are of the opinion that the total score of A company would have far exceeded that which was actually totaled —and might easily have exceeded B company's score, *for A company had the superior physical power.*

4. *Is there need of redirecting the activities of individuals?*

The evidence so far adduced points strongly towards the necessity of treating individuals in each company more *as individuals* and less as equal members of a team. This is particularly brought out by the small number of activities for the low P.F.I.'s. These boys above all need individual attention and a fairly large number of physical activities to develop them into normal young men with at least a fair amount of enthusiasm for activity. But they lack endurance—surplus physical power—and so they tend to become less and less active. These sedentary habits are likely to persist unless altered while boys are still in school.

Contrarily, those with high P.F.I.'s do not need to engage in so

many physical activities. The program itself, as well as the guidance of supervisors, should lead these to engage in other forms of living than violently physical ones.

Thus, the strength tests show very definitely that those students who participate most as a whole have the highest Physical Fitness Indices; and vice versa, those that participate least have the lowest Physical Fitness Indices. This may be due to the individual's high P.F.I. gained before enrollment or it may be due to participation after enrollment. The evidence of an imposing array of experiments elsewhere makes it necessary to accept the viewpoint which regards the P.F.I. as the indication of the individual's organic vigor and fitness for meeting life's tasks. *Then during the course of the athletic program those students with low Physical Fitness Indices and low individual activity scores should be the object of the most attention by coaches and supervisors so as to improve their physical fitness and therefore their "chances in life" physically.*

5. *Is the special incentive program worthy of continuance?*

As a method of stimulating more activity, the point system of competition induced more activity than had occurred before it had been introduced. But even the most cursory analysis of P.F.I.'s reveals that students were not stimulated in accordance with their needs. *The condition was quite the reverse.* Moreover, there was no adjustment of activities to individual needs on any level or in any company.

The scoring system did seem to stimulate company B to plan and execute a superior method of action—that of dividing into smaller competing groups within the company, which stimulated each other to "more activity." But more activity of the wrong kind is only worse than none at all. Thus, it is questionable whether the point system, *in the long run,* is a safe device, since competition itself is a destructive social technique, while certainly the tendency is to disregard students' real needs. An investigation should be made to determine all the effects of the point system—or at least the chief physical and social effects.

CONCLUSIONS

In interpreting the results of the evaluation of the program of physical education activities at the Emory Junior College and Academy, the following facts should be considered:

1. The scoring system for participation in activities was already in operation and functioning with a reasonably fair degree of success so far as student interest and participation in activities were concerned. However, this system seems to stimulate the most efficient, who need activity least, to participate most, while it fails to stimulate many who need activity most to indulge in more than a bare minimum of activities and is anti-social in consequence.

2. The P.F.I. tests were introduced to discover if better means of

equalizing company teams were available and to see what relation the point system in participation had to the strength tests. It was discovered that the weight basis, while not a bad means of equalizing opponents, yet was far from satisfactory[2]; and it was concluded that the P.F.I. or S.I. basis of selecting companies is considerably better. Research should be begun immediately to determine whether the S.I. or P.F.I. is more productive.

3. The results presented indicate that participation in a number of activities goes along with a higher strength score and a higher physical fitness score. Since in this group those individuals with low participation had also low strength and physical fitness scores, the conclusion seems justified that the application of the strength test measures will provide a means of singling out those individuals who need special attention and possibly special motivation in activities, if the program of physical education is to lend itself to a better functioning of the entire organism.

4. Carefully maintained records of the scoring system in participation and the strength measure over a period of years should enable one to determine even more accurately the effect of program, participation and motivation upon those individuals who at the present time are below the average of their company members both in participation and in strength.

[2] The S.I. is just twice as valid as weight as a measure of competitive ability in actual contests. Probably the P.F.I. is even better when the Emory system is used. (Ed.)

Uses of the Physical Fitness Test Battery in the Personnel Department of an Industrial Plant

By Harry G. Oestreich

IT IS generally recognized that health is an invaluable asset for success in life, be the occupation what it may, but the degree to which this quality contributes to the sum of man's temporal achievement has never been demonstrated. It is unquestionably vital to the physical well-being of our society that we be able accurately to measure the emphasis which health deserves as an assurance for success. Such a measuring device would be of enormous economic worth to industry, and herein lies a future development of dynamic tests and measures of physical fitness. The field is new and uncharted, but the opportunity for a definite contribution exists.

The P.F.I. has proved its worth as an educational device which measures an individual's health—"capacity for activity." Innumerable experiments have been conducted which reveal its diverse utility; and the fund of evidence that substantiates the contentions advanced is voluminous.

The following is a sketch of a proposed study by the author which is to be presented as partial fulfillment for a Doctor's degree in Education:

Purpose.—It is the purpose of this study to determine the prognostic value of the Physical Fitness Test scores to ascertain employees' aptitudes for continued efficient service in the type of work for which they are employed.

Scope.—These tests are to be given to a fair sampling of the employees of (Hood Rubber Co.) selected at random, but guided to the extent that all phases of work in the industry be adequately represented. Retests will be made at regular intervals to determine changes in physical status as revealed by the original and subsequent tests.

The data obtained from the above testing procedure are to be manipulated to determine:

1. The relation between P.F.I. and accidents at work.
2. The relation between S.I. and accidents at work.
3. The relation between P.F.I. and illness leaves from work.
4. The relation between S.I. and illness leaves from work.
5. The relation between P.F.I. and tenure of work.
6. The relation between S.I. and tenure of work.
7. The relation between P.F.I. and work efficiency.
8. The relation between S.I. and work efficiency.

9. The relations between combinations of P.F.I. and S.I. and accidents, illness leaves, tenure of work, and work efficiency, to determine the best composite.
10. The relation between speed of work, hours of work, and type of work to the physical status of the laborer.

The breadth and depth of this study will of necessity depend on several factors. For example, the size and treatment of the sampling will be influenced by the following considerations:

1. The amount of equipment.
2. The intervals between retests.
3. The number comprising the testing staff.
4. The amount of time allotted to testing.
5. The ease by which subjects can be obtained for testing.

To check the validity of the P. F. I. as a measure of "capacity for activity," three criteria have been set up for the measurement of work efficiency:

1. The work superintendent's rating.
2. Piece-work rating.
3. Promotion and pay raise rating.

Ultimate Aims.—The aims of this study are to:

1. Determine the prognastic value of the test scores relative to the prospective employee's aptitude to fill a vacancy for which he has applied.

2. Arrive at P. F. I. or S.I. standards which will numerically describe an employee's capacity for continued service at specific types of labor.

3. Offer evidence toward the solution of best age or time when the Old Age Retirement should begin by investigating the propriety of determining retirement in terms of S.I., P.F.I., or some combination of the two qualities.

4. To establish, if possible, standards on the basis of the S.I., P.F.I., or some combination of the two, which will aid in the organization of working hours, job schedules, etc., without injuring the health and impairing the working efficiency of the employee.

Case Studies of Unusual Physical Fitness Indices

By Elizabeth Zimmerli

THE VALIDITY of strength tests as measures of capacity for physical activity needs no further demonstration than the logician's argument: without strength there can be no physical activity; capacity for activity must be proportional to strength; the two are as "inseparable" as the two sides of a coin. But the inner significance of Physical Fitness Indices is often obscured by the variety of conditions they may accompany or reflect—like blood temperatures or tuberculosis or I.Q.'s.

Many casual critics have observed that P.F.I.'s are poor substitutes for medical examinations. The writer understands that they were never so intended. But that they may be valuable—sometimes invaluable!—*supplements* to medical examinations, no one who has compared P.F.I. records with mental or physical health reports can doubt.

It was to provide herself and others with material which might deepen their insight into the meanings of P.F.I.'s that the writer gathered some hundred-odd reports of "unusual cases" from physical educators whose experience in testing and analyzing pupils was fairly extensive. Unusual cases were desired because these bring into sharper relief conditions which must exist at every P.F.I. level.

The reader should not fall into the error of concluding that he or she can, from P.F.I.'s diagnose causes of deficiencies. The fact is quite otherwise. A low or high Index is merely a *danger sign*—an added danger sign in cases where other stigmata are present, such as marked over- or underweight, appearances of fatigue in complexion or posture, abnormal temperature, etc.—*but often a unique danger sign when the subjective analyses of general practitioners fail.*

MISCALCULATIONS AND MISINTERPRETATIONS

This report will take occasion, also, to correct other apparently common misinterpretations and misuses of P.F.I.'s. For example, occasionally a reporter's confidence has wavered concerning the significance of P.F.I.'s which hover near average—or even those which seem to indicate conditions contrary to *subjectively determined* "facts." The cause is not seldom to be found in simple errors in arithmetic, as for example, that reported to the writer from a large mid-western city. The reporter expressed concern because a girl's P.F.I. had risen sharply without ap-

parent reason and contrary to subjective judgment of the child's true status:

1. H.K. (Rocky Mountain State), whose P.F.I.'s were 82, 79, 106, 90, 125. The reporter says "very poor in physical education work; she failed work for two semesters. No athletics with no interest in activities." A check of this card revealed two errors, one in choice of norm and the other in adding push-ups and pull-ups—6 plus 16 were made to total 32. When this test was recalculated the P.F.I. was found to be 108, confirming the teacher's judgment of the pupil's condition, but correcting her misjudgment of test significance.

A second common error noted by the writer is reflected in the bewilderment of many correspondents to account for high P.F.I.'s in pupils inexperienced or uninterested or unskilled in sports. This misinterpretation probably comes about because of the known fairly high relation of S.I.'s and P.F.I.'s to athletic abilities. Those who use strength tests to classify pupils in sports or to equalize opposing teams should remember that these Indices are far from being perfect measures of ability in any *particular* sport. They indicate limits of accomplishment, as an aeroplane motor's horsepower limits its speed but not its actual manœuverability, except in a general way. Thus:

2. R.S. (New York) whose P.F.I. was 120 was criticized by the reporter as "poor in her apparatus gymnastics work and uninterested and unskilled in most sports. She dances well, but can hardly throw a ball. Why is her P.F.I. so high?" asks the reporter.

And the reverse is often true with boys:

3. E.P. (New England) whose P.F.I. is 88 is "an outstanding star in three major sports. Why should his P.F.I. be low? He is as hard as iron." But this boy weighs 182 pounds. His athletic prowess is due to high total strength, rather than "fitness to keep going at a rapid pace for protracted periods."

DISAGREEMENTS BETWEEN MEDICAL JUDGMENTS AND P.F.I.'S

The writer is particularly intrigued by the cases in which examining physicians have failed to discover defects or diseases which low P.F.I.'s forced them later to seek and find. For example, from a large eastern city:

4. R. (New York) whose P.F.I. was low. Test apparently inaccurate because pupil did not lift properly. No defects on medical examination or personal history. The low P.F.I. brought the pupil to the director's attention for a personal interview which disclosed the fact that the pupil "felt strained" whenever he lifted.

The pupil was referred to a physician for a thorough re-examination. Diagnosis: enlarged inguinal rings. Operation recommended. Contacts made with hospital, physician, and family. Operation performed during Christmas vacation. Pupil back at school, well on the way to normal, active life.

5. G. (New York) whose P.F.I. was low on account of poor leg lift. No defects reported on medical examination. Complained of pains in arch and calf. Pedograph prints showed right arch angle of 27 degrees, and left arch angle of 36 degrees.

Given "home work" card of exercises to be practiced daily. In six weeks, increased right arch angle 11 degrees, and left angle 1½ degrees; no pains in calf or arches. Went out for track team, and ran 440 in 52.3 seconds.

6. G.F. (Lynbrook) was observed by the school physician to have an apparently weak right grip and low vitality. The physician could find no cause, but appealed to the director of physical education. Reference to the pupil's record card showed P.F.I.'s as follows, over a period of three years: 109, 98, 99, 84. His general fitness was, therefore, declining. His lung capacity was 112, 120, 150, and then 140, indicating some fundamental defect. His left grip was 50, 55, 70, 82, indicating a normal increase in the power of this hand, but his right grip was 50, 60, 70, 65, indicating some defect on the right side. The record also showed a low right shoulder and slight scoliosis in the vertebrae.

Still no first cause was apparent. The boy was sent to an orthopedic physician who diagnosed it as syringomyelia. A year later the boy had almost completely lost the use of his right arm.

7. R.F. (Montreal, Canada) P.F.I. 58. This first P.F.I. was scored in December with no report of defects by the physician. Special attention was given him and in June his P.F.I. had risen to 71. But in September he had slipped back to 61. The physical director became suspicious, advised the boy to secure a thorough physical examination. This was done.

The physician's report of various laboratory analyses and tests closed thus: "I think there is no question that the problem is chiefly one of focal infection plus a slight endocrine imbalance. I believe the sooner he has the sinus infection cleaned up the better it will be."

The case recorded above is one of those clear cases in which the P.F.I. revealed conditions which the ordinary medical examination does not discover. Such cases, however, are relatively few and perhaps ought not to be emphasized or pointedly brought to the attention of physicians for fear of misinterpretations.[1] Of course it sometimes happens that the P.F.I. fails to reveal defects which are apparent to medical examiners. But no measure is or can ever be perfect.

CONDITIONS REFLECTED IN LOW P.F.I.'S

What may be done for pupils with low P.F.I.'s is indicated by the following dozen examples. They have been chosen to represent a wide variety of conditions which are reflected by low P.F.I.'s.

8. J. (New York). Low P.F.I., *underweight, poor posture.* History of "spotty" paralysis, resulting in partial atrophy of left arm and shoulder. Referred to orthopedic physician, who prescribed developmental exercises for atrophied condition, posture training, and diet instruction.

In five months, pupil has raised shoulder height ⅛ inch; gained 7 pounds; improved his posture; and increased his P.F.I. 30 per cent.

9. Z. (New York). Low P.F.I.—*poor arm and shoulder score on account of stiff elbow joint.* Referred to orthopedic physician, who prescribed special exercises with pulley weights. Pupil can now, at end of second semester, straighten fully the elbow joint, and shows a high degree of flexibility; with a P.F.I. increase of 20 per cent.

10. K. (New York). Low P.F.I.—*markedly obese*; flat feet. Medical examination showed no glandular defect. Physician prescribed regulated diet, daily "work-

[1] It is highly significant that practically every physical educator who introduces P.F.I. testing into school or camp work reports that his medical examiners have subsequently become very much more proficient in examinations and interested in follow-up work. (Ed.)

out," and foot posture exercises. In one semester pupil has lost 7½ lbs., improved P.F.I. 10 per cent and shows progress toward correcting faulty foot posture.

11. F.S. (New England) P.F.I. 84—*average weight for height and age.* No physical defects reported before, during, or after the medical examinations. However, when parents were told of the low rating, the father called at the school to discover the reason, and revealed the true cause.

During the preceding year, the boy had had five mastoid operations and ptomaine poisoning. In convalescence the boy gained sufficient weight and color to mask his true weakened condition from physicians.

As a consequence of the P.F.I. test report the parents, boy, family physician, school physician, principal, and physical director will cooperate in protecting his health.

12. B.I. (New England Private Camp) P.F.I. 61. This girl, about "five pounds underweight for age and height" is a *psychiatric case.* She "sprains" her back whenever she lifts, complains to parents on the slightest provocation, is boss of the family at twelve years. She comes of a very well-to-do but eccentric family.

The P.F.I. test revealed an apparently weakened body, but the score was "circled" because no leg lift or arm strength tests were given. This girl was referred to a psychiatrist and her parents warned of her growing mental maladjustment.

13. R.S. (New England Camp) P.F.I. 70. Slightly overweight but handsome. His defect is *social maladjustment.* He watches others, is self-conscious, is a fingernail-biter. He is jeered by his playmates and avoids self-testing. He is the butt of the camp and admits social and even physical defeat. The treatment indicated is involved but straightforward.

By requiring R.S. to engage in daily exercises and curtailing his diet somewhat he can be very greatly improved in actual physical powers within a month. When shown his improvement, and as he sees himself surpassing his tormentors, he will gain new confidence. (Unfortunately the report does not state how this case was handled.)

14. W.G. (New York State) September P.F.I. 67—weight average for height and age. *Eyes badly strained by school work.* The only defect of this boy was eyestrain and the consequent fatigue of study. Glasses were provided, study became easier and the following May his P.F.I. had jumped to 108 in spite of a weight increase of 10 pounds and an increase in height of two inches.

15. M.A. (New York State) September P.F.I. 65—weight average for height. *Some evidence of malnutrition due to faulty diet, and goitre.* A physician's care was secured and proper food provided for this girl. In May her P.F.I. was 95.

16. P.C. (New York State) P.F.I. 76—weight average for height. *General fatigue due to overambition.* This boy appeared big and stalwart. He participated regularly in cross-country, was faithful, trained well—too well, but year after year "came in last." The reporter "was at a loss to understand his failures as seemingly everything was in his favor." The first strength test revealed the reason: general muscular weakness. He was induced to drop cross-country and a year later his P.F.I. was 95.

17. B.L. (Minnesota) P.F.I. 63—weight-height relationship excellent. *Emotional imbalance* was the cause of this girl's low P.F.I. She was nervous, easily upset, lacking in accurate neuromuscular responses. Inquiry at home revealed a head injury at birth, the girl now being under the care of the Mayo Clinic.

As a growing child she could not coordinate sufficiently to walk. Careful individual attention will work wonders with this girl of sixteen years. Within a month her grip strength alone was raised 20 per cent.

18. F.M. (New England) P.F.I. 79. *A kidney injury* during football was the cause. This case is of special interest because the boy had been an outstanding athlete in three major sports for three years. His score was so surprisingly low that the physical director retested him soon after, with the same result. The boy then told

the puzzled instructor the reason *which he had hidden up to that time from everyone*, though last spring his previous outstanding superiority as a baseball pitcher completely deserted him. . . .

19. N.E. (Northeastern University) P.F.I. 61. This boy was *obese*, weighing 224 pounds. A special program was given him which he failed to follow. Six weeks later, a P.F.I. test showed a gain in weight to 235 pounds and P.F.I. 57. At this time the director accepted N.E. as a special challenge. (These are the most difficult cases.) At the end of the second six weeks his weight was reduced three pounds and his P.F.I. raised to 67—a remarkable gain, for his strength had increased 10 per cent.

CONDITIONS REFLECTED IN HIGH P.F.I.'S

If low P.F.I.'s are interesting and revealing, it is no more than the layman would suppose. But quite as interesting reports result when we probe very high P.F.I.'s. The theory is that these individuals are overdeveloped—too "fine"—about to "go stale" or even suffer physical and nervous breakdowns. Even at best, they are maintaining physical powers they do not need and are likely to become muscle-bound. One of these is:

20. R.K. (New England.) His record is so extraordinary that it is reproduced in full below:

Grade	II		III		III	
Age	15y	8m	16y	1m	16y	3m
Weight	161¼	—	161	—	161¾	—
Height	70	—	71	—	71	—
$\left(\frac{\text{Wt.}}{10}+\text{Ht.}-60\right)$ *Multiplier*	—	26	—	27	—	27
Pullups	34	—	27	—	30	—
Pushups	20½	64	31	58	40	70
Arm Strength	1	04	2	16		
	15	60	13	50	18	90
Lift-Legs	9	35	10	00	10	80
Lift-Back	4	35	7	45	7	00
Grip-Left		97*	1	32	1	40
Grip-Right	1	37	1	35	1	40
Lung capacity	3	10	3	40	3	38
STRENGTH INDEX	3578		3918		4288	
Normal S.I.	2059		2116		2116	
PHYSICAL FITNESS INDEX	173		185		202	
Classification	*Broke Arm					

This boy is seriously overdeveloped. He was stimulated, the director fears, to train up by an outstanding first record. A generation ago strength tests received a black eye because so many college men engaged in absurd weight-lifting and other exercises "to break the Harvard strength test record." R.K. is now badly muscle-bound, though apparently not yet overstrained.

This record is highly significant also because it proves that P.F.I. norms are not "too high for boys above average size" as is often imagined by directors who so judge norms when "star athletes" turn up with low P.F.I.'s.

Each of the following cases indicates a different condition:

21. M.K. (Minnesota) P.F.I. 156 though apparently much underweight (height 65.8, weight 102). *General appearance poor; physicians disagree on condition.* M.K. owns a horse, rides every day, general appearance deceptive; roundshouldered, thinness accentuated by heavy bones. Frequent dark circles under eyes. Restless and overvivacious. Health service record reads: "Medical re-check before permitting vigorous activity." But the family physician approved her for any activity. The high P.F.I. with other signs, indicates definitely that M.K. is overtrained.

22. G.K. (New England) P.F.I. 150. *No other conditions noted*, until parent visited school when told her son was "too strong." She reported boy's father "overdid" and was high-strung, so that he had suffered a "nervous breakdown." The boy's tendency was to be "like father"—play tennis hard all day and so forth. Parents advised to have boy curtail physical activity.

23. P.R. (Boston) P.F.I. 198. She was reputed the "strongest girl in the neighborhood"—best runner, skater, and so forth. She had no apparent physical deficiencies, but investigation revealed *social and scholastic maladjustment* with an I.Q. of 110. She has repeated the seventh grade twice, for she cannot sit still long enough to concentrate. Her home environment is difficult. Wealthy family, but one of eleven children, whose father is said to have "died of the shock of losing his last million." P.R. is a charming girl physically and emotionally. She needs only to be restricted in physical activity and induced to study or read.

24. A.E. (Boston University) P.F.I. 145. *A clear case of physical fatigue.* Miss E. complained that for three years she had been tired. Her weight had dropped from 145 to 121 (height 66 inches) without apparent reason. Overtrained, overstimulated, overanxious; a candidate for a psychiatrist unless she changes her program.

25. B.H. (New England) P.F.I. 189—*overambition.* This junior high school girl is apparently normal—very attractive in appearance, apparently quiet. This report is made in detail to indicate a helpful form.

a) *Physical Status.*—High P.F.I. due to three or four factors. She rides a bicycle constantly in a hilly community; has taken private dancing lessons for five years; swims all summer; and comes from a family well-to-do and socially active.

b) *Social Status.*—An active leader of social groups. She is a ringleader of an "overactive" social group (teacher judgment). The mother is a Y.W.C.A. lay leader who stimulates the girl. The girl is a behavior problem in school and was disciplined last spring for emotional outburst at examination time. The teachers say she can accomplish "anything she *wants* to do." She has strong superiority complex which is covered up by show of modesty and refusal to extend herself unless or until she is certain to perform very well.

c) *Academic Status.*—"Fair to middling." Has I.Q. of 112; refuses to extend herself academically; has grades of *B* to *C*, dropping from high *B* to middle *C*.

d) *Treatment Recommended.*—A complete review of her physical and social activity programs in school and out—to "steady her down." She needs much less physical activity, more reading, less social excitement if she is to avoid excessive physical and emotional strain.

The Relationship of Certain Sociological Factors to P.F.I. Tests in a Specific Rural Environment*

By Harold K. Jack

PURPOSES AND METHODS

IT IS the purpose of this study to discover what influence certain sociological factors may have upon P.F.I. test scores. Individual differences in physical capacity and indications of defects as measured by this test cannot be dealt with or defects corrected from an analysis of the test score alone. *The sociological background of the pupil must be included.* Due, perhaps, to the lack of appreciation of the importance of sociological factors, teachers often ignore the influences that these factors may have upon test scores.

1. It is the purpose of this study to investigate to what extent certain sociological factors may influence test scores.

2. The sociological factors to be compared with the P.F.I. tests are as follows:

a) Hereditary factors, as judged from a comparison of P.F.I.'s of siblings.
b) Intelligence, as measured by the Otis Self-Administering Test.
c) Economic status of the family, as obtained from a joint rating of the Sims socio-economic chart and the ratings of school officials.
d) School attendance, as obtained from the school records.
e) School success, as measured by the average grade of the pupil in his regular work.
f) The size of muscle, as obtained by using the method devised by Franzen for the measurement of muscle.
g) The amount of subcutaneous tissue, as obtained from the method recommended by Franzen.
h) Tuberculin history, as obtained from the various school records.
i) Racial factors, as judged by a comparison of whites and Indians.

3. P.F.I. and other tests were given to 246 pupils in grades 5-8 inclusive in the 20 rural schools of District No. 6, Itasca County, in November 1933, including 120 girls and 126 boys. Inasmuch as every child in the 4 grades mentioned was tested, the data are representative of the situation as it exists in that particular locality. Thirty-nine of the children tested were of Indian blood. The remaining children were of pure white stock.

The P.F.I. test was given in one session, when readings for subcutaneous tissue and size of muscle were also obtained.

The economic status of each family was determined by the Sims

* Abstract of a Master's Thesis prepared at New York University in 1933.

questionnaire combined with the ratings obtained from the Rural Supervisor and the Superintendent of Schools.

School attendance was obtained from the records of classroom teachers. The attendance period used was the first semester of the school year, 1933-1934.

School success for each pupil was measured by the average mark earned during the first semester of the school year 1933 to 1934. Although it is known that school marks are not a reliable measure of what the child has learned in school or has obtained from school, yet they were the only means available to obtain a measure of school success.[1]

The amounts of subcutaneous tissue and the measurements of size of muscle were obtained by the method used and recommended by Franzen.[2]

Tuberculin histories were obtained from the records in the office of the school and from the records of the Minnesota State Tuberculosis Sanitarium. Mantoux tests and X-rays were the devices used to check for tuberculosis.

The race of each individual was obtained from the school records and checked at the time of testing. The two races were white and Indian.

The objectivity as well as reliability of the P.F.I. test results was checked by having a group of boys tested on different days. The first day the regular tester gave them the test. On the second day a second trained tester gave the test.

The correlation obtained between the two testings was .89. Such a correlation is indicative of a high enough relationship to establish a reasonable reliability of test results as well as the objectivity of tests and efficiency of testers.

The same procedure was followed in checking accuracy of technique in the testing of the amount of subcutaneous tissue and size of muscle. The correlation between the two testings for the size of muscle was .96. The correlation obtained for the 2 testings of subcutaneous tissue was .83. In both cases the correlation was high enough to show that the testing was efficiently performed.

COMPARISONS OF FACTORS

Genetic Factors.—In considering the genetic factors the following correlations were made: comparisons of the P.F.I.'s of siblings. The correlation between 72 cases of P.F.I.'s of siblings was .16. This relationship was lower than that reported from a previous investigation of Kulp and Davidson who obtained about .40 on strength and such physical factors as height, weight, and a physician's judgment. Inasmuch as

[1] See also the comments of Giauque, page 272.

[2] *Physical Measures of Growth and Nutrition*, Chapter II.

the P.F.I. is a more valid measuring device for determining true physical fitness than such static or unreliable measurements as weight and subjective medical judgments, it would seem from the above data that there is less similarity between siblings' physical powers than has been previously reported. The new results may be due to the present more concrete and objective measuring devices of physical fitness.

Relation of Intelligence to Physical Fitness.—The results of all comparisons between intelligence and physical traits have resulted in correlations of approximately zero.[3] In most previous cases a doctor's evaluation of physical condition was used as the basis. Using the P.F.I. as the measure of physical power and correlating it with the I.Q. as obtained by the Otis Self-Administering Test a correlation of .0006 for boys and .02 for girls was shown. These results agree with findings by other investigators. Apparently the physical condition of the child has little effect upon the I.Q., or vice versa.

Comparison of Economic Status with Physical Fitness.—The Sims socio-economic questionnaire was used to determine objectivity in the measurement of economic status. However, to check the validity of this test for this study, various school officials, including the superintendent and rural supervisor, rated the families. The correlation coefficient for the combined ratings with the P.F.I. was .34 for the boys and .08 for the girls. From these correlations the Predictive Indices of which are .06 and .00 respectively, it can be seen that the homes in this part of Minnesota have some slight influence upon the P.F.I. The home background is usually an important factor in the development of the child. The correlation obtained above indicates that some relationship exists and that the home must not be ignored. On the other hand, the correlation is surprisingly low.

Comparison of School Attendance with Physical Fitness.—Attendance at school is often considered to depend on health. We assume that the child in good physical condition will be anxious or able to attend school and participate in its activities. Are the students who stay out of school those individuals with low P.F.I.'s and therefore low in health and vitality? Or is school attendance another matter?

The correlation coefficient between the P.F.I. and attendance records is —.02 for the boys and —.21 for the girls. The conclusion would follow that little or no relationship is shown. Apparently many factors enter into the attendance problem beside general physical fitness. Factors such as transportation, work at home, and the lack of interest in school account, in part, for the low correlation obtained above.

However, in addition to the above correlations the mean P.F.I. was

---

[3] See particularly the bibliography of Rogers' *Physical Capacity Tests in the Administration of Physical Education*, Chapter VII. New York: Bureau of Publications, Teachers College, Columbia University, 1925.

calculated for the boys and girls who were not absent a single day in the time covered by this study, and this mean was compared with the mean P.F.I. of those who were absent one day or more. The mean P.F.I. of boys not absent was 98.8, while the mean for those absent one day or more was 83.3—a difference of 15.5 P.F.I. points, or 17 per cent. The mean P.F.I. of girls with no absence was 98.2 and of those absent one day or more was 93—a difference of 5.2 points or 6 per cent. These differences between means, especially for the boys, may be indicative of the effect on school attendance of their health and vitality. Further "the significance of the difference of the means" was calculated, and shows that the chances are 90.6 out of 100 for the girls and 99 out of 100 for the boys that the average P.F.I.'s of cases with perfect attendance record are higher than the P.F.I.'s of those of one or more days absence.

Evidently physical fitness does affect the child in such a manner that the boy or girl with a high P.F.I. is much more likely to have a perfect school attendance record.

Comparison of School Marks with Physical Fitness.—The ability of a pupil to do the required school work ought to depend upon the strength of the pupil—hence, the necessity of physical well-being if the school work is to be done efficiently. The purpose of this particular inquiry was to determine if the P.F.I. had any relation to the grades of pupils. Correlating the P.F.I. with school success as measured by grades, the following comparisons were obtained: (*a*) —.21 for the boys and (*b*) +.10 for the girls. Thus no relationship seems to exist between the two measures. This research agrees with other findings that school marks are not yet dependent upon the physical condition of the individual.[4]

Comparison of the Amount of Subcutaneous Tissue and Size of Muscle with the P.F.I.—Inasmuch as the amount of subcutaneous tissue and size of muscle are considered to be measures of nutrition,[5] they will be discussed together. Good nutrition is considered essential to the well-being of the individual and hence, it might affect the P.F.I.

The muscle measured in this particular case was the biceps muscle of the right arm. This muscle is one of a group that is used to determine arm strength in the P.F.I. It was chosen because, according to Franzen, it is most characteristic of the total muscle size of the body.

The correlation between the amount of subcutaneous tissue and the P.F.I. is —.02 for the boys and .02 for the girls. The same situation exists in size in the case of muscle. It will be seen from the correlations that no relationship exists between the two measures. Apparently the nutritional condition of the body *as judged by the size of muscle and*

[4] See also Giauque's comments on page 271.
[5] Raymond Franzen, *Physical Measures of Growth and Nutrition.*

amount of subcutaneous tissue has little influence upon general physical fitness.[6]

Comparison of Tuberculin History with Physical Fitness.—The study of the factors of tuberculosis infection presented many difficulties. The complicated medical procedure necessary to determine infection, together with its expense, limits the school in the work done. Only the Indian children had complete and accurate records from Mantoux Tests given by the Indian Agency, and by X-ray plates given by the Minnesota State Tuberculosis Sanitarium. The small number of Indian children tested makes it impossible to accept the findings as in any sense final; yet the trend shown by the study may be significant. The attack of the disease upon many who are ignorant of their infection, the seriousness of the disease, and its wide distribution are still important problems in the health of the school child. It is known that the disease strikes when the body is in poor physical condition. The questions that would follow are: Is there any indication that the P.F.I. may reveal predisposition to infection? Or do pupils who have no sign of tuberculosis infection have low P.F.I.'s?

Correlations were obtained by the bi-serial r method. After correlating the P.F.I. with those children who had a positive Mantoux Test and a positive sign from the X-ray—the correlations were found to be .54 for the boys and .28 for the girls. These coefficients seem to show a slight relationship between tuberculosis and the P.F.I.[7]

Racial Factor as Judged by a Comparison of the Whites and Indians.—The 207 white and 39 Indian children found in the district were compared upon all sociological factors discussed previously. Racial differences are always interesting. However, the same general environment for children of both races tends to equalize factors influenced more by environment, thus tending to bring out better the racial factors and differences that exist. To determine the amount of difference between the two races in P.F.I. score, a comparison was made of the mean and median P.F.I.'s. Table I shows the result of this comparison.

The significance of the differences between the means was determined, and it was found to be 73 per cent more reliable for the girls than necessary to insure reliability. That is, there are one hundred chances in one hundred that the difference between the true measures is greater than zero and hence, the mean P.F.I. of white girls

---

[6] This conclusion suggests the propriety of further investigation of the *relative* validities of A.C.H.A. ratings of nutritional status and the P.F.I. as *a measure of nutritional status* as well as of general physical fitness. (All available evidence at the present time indicates that the P.F.I. is also the best objective measure of nutritional status available to school offices. Ed.)

[7] Recent studies in tuberculosis sanitaria seem to indicate but a slight relation if any between the presence of tuberculosis in children and reduction of strength, *in the early stages of the disease.* Of course, in more advanced stages, strength declines rapidly, as does weight. (Ed.)

would be higher than of Indian girls in every group studied which had the same environment. For the boys, it was found that the difference was 32 per cent greater than necessary to insure reliability.

When medians were analyzed it was found that there existed ninety-eight chances out of one hundred that the P.F.I. of white boys would

TABLE I

MEAN AND MEDIAN P.F.I.'S OF WHITES AND INDIANS

	Boys		Girls	
	White	Indian	White	Indian
Number of Pupils	102	24	105	15
Mean P.F.I.	96.39	85.62	93.3	84.17
Median P.F.I.	97.6	84.28	92.5	77.5

be higher than that of Indian boys; and that, for the girls, the median was 72 per cent more reliable than need be to insure that one hundred cases out of one hundred would show the same.

It thus appears that the white child in this section of Minnesota is in better physical condition. These findings agree with the opinion commonly held by residents of this district. Here, however, a reliable and objective measuring device was used, thus giving opinion the support of objective proof.

In Table II, the Indian child seems to vary very little from his white neighbor, except in muscular power, noted above. What differences exist may be due to the degenerating influences that are prevalent among Indians.

TABLE II

CORRELATIONS BETWEEN VARIOUS FACTORS AND THE P.F.I.'S OF WHITES AND INDIANS

Factors	Boys		Girls	
	White	Indian	White	Indian
School Success	—.21	.22	.10	.03
Attendance	—.02	.13	—.21	.02
I. Q.	.0006	—.09	.02	.32
Sims Questionnaire	.29	—.03	.12	.30
Subcutaneous Tissue	—.02	—.12	.02	—.39
Size of Muscle	.07	.10	—.42	—.53
Siblings	White .16		Indians —.57	

Because of the lack of a sufficient number of cases among the Indians, these findings are in no sense conclusive. At best they merely suggest trends of differences that exist between the races. For the most part, as far as the data show, there is relatively little difference. However, it does seem clear that differences do exist between the two races in regard to their physical fitness.

The relationship of physical fitness to the specific sociological factors studied appears to be the same for both races. It is obvious that

the Indian is not so far removed from the white in physical endowment. Given equal standards of living he may again prove equal in all.

CONCLUSIONS AND RECOMMENDATIONS

Remembering always that the data are insufficient to do more than suggest probabilities, the general conclusions drawn from the above data show:

1. That little relationship exists in physical fitness between members of the same family. Brothers and sisters are not sufficiently alike to show a high correlation of similarity. As a result each individual should be considered apart from brothers or sisters in judging or promoting his physical fitness.

2. That strength and physical fitness are but negligibly associated with the general mental status of the pupil as many other studies have disclosed.

3. That there is surprisingly little relationship between the economic status of the child's family and the child's P.F.I. *The physical educator should be acquainted with the home and the economic conditions of each child, but should not assume, because he finds them to be good, that the child will be well cared for.*

4. That some relationship seems to exist between school attendance and physical fitness. The chances are between ninety and ninety-nine out of one hundred that the P.F.I. of the average child with a perfect attendance record is considerably higher than that of the average child with one or more days' absence. However, no correlation of any significance is found between number of days' absence and the P.F.I. This probably is due to the many factors other than illness that influence school absences.

5. That there is no relationship between school success and the P.F.I. This agrees with previous studies. The conclusion *would seem to be* either that the school cannot expect the child to succeed academically only because he is strong and healthy, or that teachers do not take proper advantage of pupils' physical powers in assigning work or requiring performance.

6. That there is but little relation between the amount of subcutaneous tissue and the P.F.I. The conclusion from this would be that one or the other is a poor measure of nutrition.

7. That the difference in physical fitness between the white and Indian children is definite and favors the former. Also, that the relationships, for both races, between the sociological factors measured and the P.F.I. were nearly the same. Probably the Red Man is not such a problem as we often think. Given the same chances as the white, he will develop equally with him.

8. P.F.I. tests are useful far beyond their intended classification and examination purposes.

A Study of the Effects of Two Diets on Physical Powers

By L. Charles Rosenberg, M.D.
and
Frederick Rand Rogers

I

BETWEEN June and December, 1929, one of the authors sought to determine the effects, on children aged five to fourteen years, of a special diet composed largely of milk, whole grain cereals, fruits, vegetables and nuts, and exclusive of meats, *as contrasted with* a diet which included large amounts of meat, white bread, and eggs. The two contrasting diets are described in another report.[1]

Using great care, two equivalent groups of children were selected for the experiment. None were included who were suffering from any disease or who had any defects likely to impair normal growth. All, however, were 10 per cent or more under average weight for height according to the Emerson tables. In the process of selection exhaustive medical examinations were given to some sixty children; the two equivalent groups were chosen by a statistician who attempted to equate experimental and control groups in age, height, weight, and sex.

The two groups lived in identical environments: all were inmates of the St. Mary's Orphanage in Newark, under the care of Sisters. They were segregated only for meals, at other times attending the same classes and enjoying the same play periods, activities, and facilities.

At the beginning and again at the end of the six months-period all subjects were examined by physicians, psychiatrists, and physical examiners. This report deals only with the physical fitness tests which determine "P.F.I.'s," and which were administered to pupils by one of the authors and Carl G. Chamberlain, using identical testing equipment and techniques for both series of tests.

As will be apparent to any person who gives the matter thought, the effects of varying the diet may be very diverse. Some foods are most effective in building bone tissue, others are chiefly useful in providing energy for immediate use, still others are necessary for normal glandular activity, etc. Moreover, the omission of certain foods, because of the vitamins these foods possess, results in seriously detructive diseases.

It is of great importance, among other factors, that the diet provide the body with energy to carry on active life and psychic or emotional

[1] L. Charles Rosenberg, M.D., "Malnutrition in Children—An Attempt at Standardization of a Diet," *American Journal of Diseases in Children*, (February, 1931).

stimuli to engage therein. Certainly a diet which increased fatty tissues while discouraging the individual from engaging in physical or mental activity would be worse than worthless except for very exceptional cases.

Finally, all life is activity of some sort; and most of it finds expression ultimately in muscular responses to sensory or mental stimuli. If muscular power is increased coincidentally with the modification of diet, the increase is evidence of one or both of two probable causes: the diet has stimulated the subject to increased muscular activity (for muscular power cannot be increased except through activity) and the diet has provided the subject with materials for primary activity and possibly also for permanently improving the cellular tissues and reserves of energy contained therein.

Now, improvement in muscular tissues may be *directly* measured structurally, chemically, or functionally. The two first-named methods are not feasible for living humans; nor are there adequate techniques to measure growth by tests of microscopic structural or chemical changes. Therefore, functional tests must be resorted to (besides the indirect evidences given by analyses of excreta, blood counts, etc.). Objective measures of muscular strength by performance tests possess special values which ought to weigh heavily in the evidence of the values of various diets: *they are directly indicative of power to engage in "life activities."* The individual who lacks strength to walk or write or talk is sorely handicapped either in earning a living or in enjoying his leisure time, while whoever possesses an abundance of muscular strength has an invaluable supply of reserve energy to achieve his objectives in life, whether physical, mental, or social.

It is of the greatest importance, therefore, that the diet be such as will preserve and increase physical strength. If it fails here, it is to be condemned, for the great majority at least.

II

Physical power may be measured in a great variety of ways—by climbing ropes, running races, walking long distances, performing on gymnasium apparatus, heaving weights, and like activities. Or it may be measured by performing those physical evolutions which are the least common denominators of the more complex movements of earning a livelihood. These least common denominators are ability to grasp and hold, lift, and carry weights with the hands, arms, and legs. The heavier the weight which can be lifted and carried, or the longer any given weight can be held or carried, the greater the power of the individual. Moreover, it is important that the heart and lungs be able to supply additional fuel to the muscle cells performing the work. These general observations should be sufficient to reveal the reasons and importance of measuring the efficiency of various dietaries in terms of scores in the following tests:

lung capacity, strength of grip, and abilities to lift weights with the back, legs and arms.

The tests used in this experiment were the "P.F.I. Tests."

III

On June 3 and 4, 1929, Rogers and Chamberlain tested fifty-five children at the St. Mary's Orphanage,[2] after which scores were calculated and records forwarded to the statistician who then divided subjects into experimental and control groups.

On December 6, 1929, the "physical fitness" testers re-examined all subjects. The testers were unaware of the status of subjects (i.e., to which group each belonged) during these tests also. Thus, no bias on the testers' part could possibly affect the records made by subjects. The resulting scores were computed, after which Rosenberg notified the testers of the identity of the two groups.

Preliminary analyses of results indicated that the experimental group comprised of 25 children, gained 174 pounds over a period of six months, as compared to a gain of 131½ pounds for the control group. It is significant that the average subject weighed (in June) approximately 52½ pounds with a Strength Index of 450 points or about 8.6 points of strength per pound of weight. Assuming that about 50 per cent of the increased weight was muscle tissue, it was found that the gain in weight of each group was matched by an apparently equivalent gain in strength. That the increased strength was due to improved "muscle tone" of the muscle cells of one group over the other was not indicated, however, for the *proportionate* gain in strength of both groups was almost identical. The control group gained 12.7 per cent of its original strength while the experimental group gained 14.5 per cent of its original strength. The superiority of the experimental group was, therefore, only 1.8 per cent.

IV

The superiority in strength increase of the experimental group *as a unit* was not indicated as very great by this analysis, but further analyses revealed marked differences between the sexes. Therefore, the data were further analyzed according to sex. There were now four groups.

1. Boys, experimental group
2. Boys, control group
3. Girls, experimental group
4. Girls, control group

The data are summarized in Table I which reports the Strength

[2] Statisticians who would toss this study aside as insignificant simply because of the relatively small number of subjects involved should pause to weigh three other facts: the subjects were given practically every known test to guarantee equality between experimental and control groups; to conduct such an experiment is extraordinarily difficult; and the cost even of this experiment with a small number of children is several thousands of dollars.

Indices of the various groups, together with "gains or losses," and "differences" between groups.

TABLE I
STRENGTH INDEX GAINS OR LOSSES

No. of Pupils	Groups	June	December	Difference	Average Difference
25	Experimental Total	11398	13055	1657	65.3
24	Control—Total	10652	12013	1361	56.7
	Differences	746	1042	296	9.6
12	Experimental Boys	4459	4766	307	25.6
12	Control—Boys	4527	5072	545	45.4
	Differences	−68	−306	−238	−19.8
13	Experimental Girls	6939	8289	1350	103.9
12	Control—Girls	6125	6941	816	68.
	Differences	814	1348	534	35.9

V

The most significant conclusions from the data reported above are as follows:

1. The normal Strength Index for children of the average age and weight of those used in this experiment is between 375 and 400 points. Yet the Orphanage children averaged 450 points, indicating that their general physical powers were far above those which would be secured from a random sampling of public school children. This was to be expected, since the pupils were carefully selected as free of disease and defect.

2. The control group, though equal to the experimental group in age, height, and weight was, nevertheless, 746 points or 7.5 per cent below the experimental group in strength, though of the same weight, indicating that its physical powers were less well developed and, *therefore should improve more rapidly even under ordinary conditions.*

3. Nevertheless, the experimental group gained 296 points more than the control group. Had the two groups been equal in strength at the beginning of the experiment, doubtless the gain of the experimental group over the control group would have been much greater than it was. Seven per cent difference in physical powers for the same age and weight is very great in terms of relative fitness.[3] Moreover, this gain was made during fall and early winter months when the average child's fitness declines.

4. When the boys' and girls' scores are separated, a real difference is revealed. The experimental group boys gained 238 points *less* than the

[3] It is, in fact, the average improvement effected in summer camps of eight weeks' duration on relatively normal children who have changed from a confining school environment to an active outdoor life.

control group boys, while the experimental group girls gained 534 points *more* than the control group girls.

An error in grouping children somewhat vitiates the significance of this discovery.[4] The girls were nearly two years older than the boys chronologically, and, therefore, nearly four years older physiologically. Since the average age was about eleven years, perhaps the girls were 30–40 per cent more mature physiologically than were the boys.

Assuming that the strength differences between the groups are statistically significant, one of two conclusions may be drawn: (*a*) Children at pubescence (the girls were obviously approaching or passing through this stage) are more active physically, and (or) their nutritive needs are better met on the vegetable-cereal-nut diet, than are those of children at earlier ages; or (*b*) girls' nutritive needs are met more effectively and they are more active on a vegetarian diet than are boys.

To the authors these tentative conclusions are of paramount importance. They incline definitely to the belief that the second alternative is a true statement; that is, that girls thrive on vegetarian diets, while boys need meat—or at least, boys need more meat than do girls.

5. As was indicated above, the 1.8 per cent superior gain in strength of the experimental over the control group is doubtless less than would have occurred had the two groups been equalized in strength in June.

6. A 12 to 15 per cent increase in *strength* (not P.F.I.) over a period of six months is almost exactly the normal growth in physical power for the average child. Orphanage children in this experiment gained about sixty-two points each (average), or nearly 14 per cent, ***even though they were above average in June.*** This indicates that all were unusually active and well-cared-for.

7. The "experimental group girls" gained an average of 103 points or nearly 50 per cent more than normal growth for increase in their age and weight, while the control group boys gained an average of 45 points or about 10 per cent less than their normal expectancy. Thus it appears that even the meat diet as given was not satisfactory for the boys, while the vegetable diet was, *for boys*, almost positively deleterious. The apparent failure of the meat diet for the boys may be partially explained as due to the extreme freedom allowed all control group subjects to eat "as much meat as they wanted." (Statements to this effect were made repeatedly by Sisters in charge.)

8. The "control group girls" gained, under the meat diet, almost as much strength as normal individuals. It is quite possible that they would have been as adversely affected by eating meat as the boys were by the absence of meat *if the girls had been obliged to eat as much meat as the boys chose to.* It was a common observation of the authors that the

[4] This error indicates the lack of concern for sex differences which some psychologists still tolerate.

girls on the meat diet were less eager for "second helpings of chops" than were the boys.

VI

The analysis of strength scores reveals much of interest, and corroborates many tentative conclusions. (1) Evidently both experimental and control groups possessed unusually good physical condition and activity habits at the outset of the experiment. (2) Evidently there are real differences in the nutritive needs of the two sexes, though this conclusion is somewhat clouded by a varying age factor. (3) Probably the boys on the meat diet were permitted to eat too much meat. (4) Probably the boys on the vegetable diet missed certain food elements necessary to their development. (5) Probably girls can forego meat more safely than can boys. (6) Increases in weight in general were accompanied by increases in strength.

Thus, the experiment opens up highly important problems concerning the different nutritive needs of the sexes. Every line of investigation supports this conclusion. Even the errors of experimental procedures add to the force of the general conclusion. Concerning the relative values of the two diets, when the sex element is ignored, no positive conclusion can yet be drawn. Certainly the "vegetarian group" did not suffer any decline of physical activity and reserve power from the vegetarian diet. And certainly the girls throve on this diet.

The Relation Between Physical Fitness and "Success" in Physical Education Activities

By Bessie L. Park

THE PROBLEM

THE PURPOSE of this brief investigation was to determine what, if any, relation exists between Physical Fitness Indices and success in physical education activities in a normal school department of physical education as evidenced by school marks, and, for men, letter awards. Since numerous investigations have been made in high schools and liberal arts colleges to show the relation between physical capacity and success in specific activities, this study concerns itself with the problem in teacher education institutions offering a major in physical education, and with the relation of physical fitness to success in groups of activities rather than in a specific activity.

The activities used were those required of all majors in physical education at the State Normal School, Cortland, New York: namely, gymnastics, dancing, swimming, plays and games, and athletics. Gymnastics, as here designated, include calisthenics, marching, self-testing stunts, and heavy apparatus. Dancing embraces rhythms, folk and national, creative and natural, social, and tap and clog dancing. The plays and games course is confined to those individual and group activities of medium or low organization which are suitable for the elementary and junior high school levels, while athletics include archery, tennis, basketball, baseball, soccer, lacrosse, football, hockey, volleyball, speedball, and track.

The tests used in this study were the P.F.I. battery of strength tests.

The individuals tested were members of the physical education class who entered Cortland Normal School in September, 1931.

THE PROCEDURE

For this study there were selected at random from the freshman class of approximately sixty-five, twenty-five men and twenty-five women. The sixty-five members of the class had been carefully chosen, the previous spring, from approximately two hundred applicants. Strength tests were not administered to the group before selection and appointment. (This is now being done.)

For each of the freshman, sophomore, and junior years, there were assembled ratings, or marks, in the following activities:

For Men	*For Women*
Gymnastics	Gymnastics
Dancing	Dancing
Swimming	Swimming
Plays and Games	Plays and Games
Archery	Archery
Baseball	Baseball
Basketball	Basketball
Tennis	Tennis
Soccer	Soccer
Football	Hockey
Lacrosse	Volleyball
Track	Speedball

Likewise, the letters earned by the men as the result of voluntary participation in varsity athletics were assembled by years. Included in this phase of the study were baseball, basketball, football, soccer, tennis, and track.

Each of the activities listed was pursued for some part of each of the three years, except plays and games which is a one-year course.

At the conclusion of each season, semester, or year, a practical examination, or set of tests, was given in each activity, and marks were assigned, using the following designations:

Rating	*Approximate Numerical Value*
A—very high	94-100
B—good	87-93
C—average	81-86
D—poor	75-80
E—very poor	below 75

These marks were determined in the case of athletics, sophomore and junior gymnastics, and dancing by subjective judgments of teachers concerning:

a) Individual and group techniques.
b) Written rules of each activity.
c) General attitudes toward the activity.
d) General attitudes toward the instructor.

Such was not the case with freshman gymnastics and dancing, and the three years of swimming, the marks for these activities being determined by subjectively measured *performance*. Letters awarded the men were based entirely on ability to perform as determined by records in races or the judgments of coaches.

The marks for all girls' athletics and swimming were assigned by the same teacher, while in the case of the boys three teachers participated, each making the ratings for the three years in his particular sport or sports. All marks in dancing for both men and women were given by the same instructor, while three or more teachers rated the work in gymnastics.

THE RESULTS

The following tables and correlations report the results obtained from this investigation.

TABLES A AND B

RELATIONS BETWEEN PHYSICAL FITNESS INDICES AND "SUCCESS IN GENERAL ATHLETICS" AS RATED BY INSTRUCTORS. (IN THESE TABLES BOTH THE P.F.I.'s AND THE RATINGS ARE THE AVERAGES FOR THE THREE YEARS—FRESHMAN, SOPHOMORE, AND JUNIOR.)

	A Men			*B* Women	
Men	P.F.I.	Rating	Women	P.F.I.	Rating
1	87	C	1	89	D+
2	101	B+	2	115	C+
3	124	B—	3	124	C
4	94	C	4	86	B—
5	104	B—	5	139	B—
6	115	C+	6	110	B
7	85	B—	7	107	B—
8	113	C	8	98	B—
9	89	C	9	71	C
10	110	C	10	72	C
11	77	C+	11	92	B
12	90	C+	12	103	B+
13	118	C	13	93	C
14	77	C	14	99	B
15	112	B—	15	120	B
16	114	B	16	79	C+
17	92	C+	17	112	B—
18	83	C	18	79	C
19	110	C+	19	98	C
20	115	C	20	85	C
21	82	B	21	128	B
22	84	B	22	119	C
23	103	B	23	120	B+
24	101	C+	24	92	C+
25	106	B	25	115	C+
Correlation = .00718			Correlation = —.00416		

THE CONCLUSIONS

All five correlations are low. Concerning the lack of correlation between P.F.I. and athletic awards it should be noted that this is the usual discovery of investigators. Athletic success for men depends on mere strength more than "physical fitness"—the S.I. is the measure to apply.

Concerning the marks assigned by teachers in *courses,* other comments may be made. A possible explanation may be ventured. Strength and skill are inseparable. Therefore, strength tests are highly valid measures of all-round skill in sports, or general athletic ability. This fact has been established again and again. Then it follows that the al-

TABLES C AND D

RELATION BETWEEN PHYSICAL FITNESS INDICES AND SUCCESS IN ALL PHYSICAL EDUCATION ACTIVITIES. (IN THESE TABLES, BOTH THE P.F.I.'S AND ALL THE PHYSICAL EDUCATION ACTIVITIES LISTED UNDER "PROCEDURES" ARE AVERAGES FOR THE THREE YEARS—FRESHMAN, SOPHOMORE, AND JUNIOR.)

C Men			*D* Women		
Men	P.F.I.	Rating	Women	P.F.I.	Rating
1	87	C	1	89	D
2	101	B	2	115	C+
3	124	C+	3	124	C
4	94	C	4	86	B
5	104	C	5	139	C+
6	115	C+	6	110	B
7	85	C+	7	107	C+
8	113	C+	8	98	B
9	89	C	9	71	C
10	110	C	10	72	C
11	77	C+	11	92	B
12	90	C	12	103	B
13	118	C	13	93	C
14	77	C+	14	99	C+
15	112	C+	15	120	B
16	114	C+	16	79	C+
17	92	C+	17	112	C+
18	83	C	18	79	C
19	110	C+	19	98	C
20	115	C	20	85	C
21	82	C+	21	128	B
22	84	C	22	119	C
23	103	C+	23	120	B
24	101	C	24	92	C+
25	106	C+	25	115	C+
Correlation = .0966			Correlation = —.00161		

most complete absence of correlation between the index of strength and that of skill is probably due to the lack of validity, reliability, and objectivity of the school marks. This, in turn, may result from any one or more of the following:

a) A failure to use exclusively objective tests in determining marks.

b) The subjective ratings of two or more instructors in arriving at a single mark.

c) The use of the "rating-scale" method of determining final marks, as is sometimes the case.

d) The effects on marks of student performances in subject matter, examinations of rules, etc.

e) The attitudes of students towards instructors and vice versa.

f) The small number of cases.

TABLE E

RELATION BETWEEN PHYSICAL FITNESS INDICES AND LETTER AWARDS IN VARSITY ATHLETICS. (THE FIGURES IN THE FOLLOWING TABLE REPRESENT THE YEAR IN WHICH THE LETTER WAS WON.)

	P.F.I.	Baseball	Basketball	Football	Soccer	Tennis	Track	Total Letters Won
1.	87			3				1
2.	101	1–2–3		1–2–3				6
3.	124	2–3	2	2				4
4.	94							0
5.	104	1–2–3	2–3	1–2–3				8
6.	115			1–2–3				3
7.	85		1–2–3		3		2–3	6
8.	113	3		3				2
9.	89							0
10.	110				3		3	2
11.	77				3			1
12.	90				3	1–2–3		4
13.	118						2–3	2
14.	77	1–2–3	1–2–3	1	2–3			9
15.	112				1–2–3		3	4
16.	114				2–3		2–3	4
17.	92			1–2–3				3
18.	83				3		1–2–3	4
19.	110		3		1–2–3	1–2		6
20.	115				1–2–3		1–2–3	6
21.	82				1–2–3		1–2–3	6
22.	84	1–2–3	1–2–3		1–2			8
23.	103	3		3	2–3			4
24.	101	2			2–3			3
25.	106				1–2–3		1–2–3	6

Correlation = .0118 — 102 Total

TABLE F

THE NUMBER OF LETTERS EARNED THROUGHOUT THE THREE YEARS AT THE VARIOUS LEVELS OF PHYSICAL FITNESS.

P.F.I. (3 years average)	Baseball	Basketball	Football	Soccer	Tennis	Track	Total
—99	6	9	5	11	3	8	42
100—114	9	3	8	16	2	7	45
115—	2	1	4	3	0	5	15
Total	17	13	17	30	5	20	102

The result of this brief inquiry confirms once more the finding of others regarding the extraordinary lack of validity and reliability of instructors' subjective ratings of abilities, whether mental or physical. The implication is clear that an overhauling of teachers' marking systems is imperative, at least at Cortland Normal School.

There is a great need for research in order that objective and valid tests of physical skills at various sex, age, and weight levels may be formulated.[1]

[1] A splendid beginning in this field has been made for elementary and secondary school children by Neilson and others in California. See Neilson and Cozens, *Achievement Scales in Physical Education Activities*. New York: A. S. Barnes & Co., 1935. (Ed.)

An Inquiry into the Correlation Between Physical Fitness and Scholastic Standing

By Charles D. Giauque

OBJECTIVES

THE PRIMARY objectives of this study are the determination of correlations between changes in physical fitness and changes in scholastic marks and between the physical strength and the intelligence of high school boys.

That there should be a certain degree of positive correlation between physical fitness and scholarship can hardly be questioned, for physical fitness is the first requisite for scholarship of any degree. The child who is entirely lacking in physical fitness is dead. Consequently, he can have no scholarship either! If alive but ill in bed, he has a small amount of fitness and only a slight possibility of scholarship. The greater his physical power, then, the greater his *capacity* for study. Of course, scholarship is also limited by intelligence and other factors; but the first prerequisite must always be physical power to sit in classes, attend lectures, keep awake and attentive to books, and perform laboratory exercises.

The case is made only stronger when we recall the psychologist's "laws of learning." "Learning depends on readiness, exercise, and effect," say these specialists in the conservation of scholarship.[1] But when one lacks physical fitness, one is unready for any active living. Exercise of almost any mental function sooner or later involves physical responses, too; and the effects of even purely mental exercises are poor if the body is tired, i.e., lacks physical fitness to carry on, minute after minute, hour after hour, day after day. Viewed from another angle, learning is most permanent—study is most effective and scholarship best achieved—when the student is most interested. But he cannot be interested if he is physically fatigued by the primary functions of eating, digestion, respiration, walking to school, and sitting in chairs. The greater the physical fitness, then, the greater the capacity for learning.

The argument outlined above constitutes one of the most effective justifications for supporting physical education in schools and colleges. But it loses some of its potency if teachers fail to harness to studies the increased physical fitness gained by pupils in physical education. The most effective teachers will seek to discover the physical powers of pupils

[1] E. L. Thorndike, *Educational Psychology, Briefer Course.*

as they do their pupils' mental powers and will then adjust scholastic assignments to these capacities, encouraging the more intelligent pupils to accomplish more than average scholastic success. Similarly, the more physically fit pupils should be so stimulated.

However, it almost seems that teachers tend to be contrary in this respect, for it appears that pupils of low physical fitness are induced to spend more time at study while the athletes are permitted to skim through with mediocre performances. If this is true, academic teachers should be made aware of their technical error so that they may improve their teaching methods, adapting assignments to pupils' real powers rather than to their degrees of docility.

One objective of this study, accordingly, might be to discover whether academic teachers are adjusting study loads to pupils' physical powers.

PROCEDURES

A unique characteristic of this study is the comparison, not of the relation between physical fitness and academic status at any particular time, but between *changes* in each. Therefore, the group to be studied must have remained in the school for a fairly extended period of time so that records of changes may be secured. Innate differences between boys and girls render it improper to combine or to contrast their scholastic or physical ratings. It was also necessary to select a school in which both physical fitness tests and scholastic ratings were available.

1. The Lynbrook, New York, High School was chosen as one having available the necessary data.[2] The sixty senior boys of the school were selected for the study. These included athletes and non-athletes, excellent scholars and average pupils.

2. Scholarship data were taken from school records—all "marks" given at the end of each year for each pupil being averaged, this average constituting the pupil's "scholarship." Marks were based on New York State Regents' examination records or, where these were not available, on school averages.

3. Physical fitness scores were determined by means of the P.F.I. tests which were given to all pupils each spring. The Physical Fitness Index of each boy for four years was, therefore, available.

4. Intelligence quotients were also determined by administering the Otis Advanced Intelligence Examination, Form A.

5. The extra-curricular activities of pupils which might affect either scholarship, physical fitness, or both were procured from the *High School Year Book*, whose editors collected the information from the students themselves.

6. Correlation coefficients were computed between pupils' scholastic marks for each year and corresponding P.F.I.'s to determine the general trend.

---

[2] Data supplied through the kindness of Alexander J. Wall, Jr., Columbia University, who wrote an excellent report of which this study is an adaptation.

7. Two groups of pupils were contrasted in scholarship — those whose P.F.I.'s had increased and those whose P.F.I.'s had decreased— to determine whether there were any specific trends hidden by the general trend.

8. A score for extra-curricular activities was computed, evaluating each activity as one unit; and the correlation between extra-curricular activities and scholarship was determined. This procedure measured roughly the amount of influence that outside activities may have had in reducing scholastic marks or affecting physical fitness.

9. I.Q.'s and P.F.I.'s were correlated.

RESULTS

1. The correlation coefficient between P.F.I. and scholastic marks for the whole group was *plus* .10.

2. The correlation coefficient between P.F.I. and scholastic marks for those pupils whose P.F.I.'s increased was *minus* .15.

3. The correlation coefficient between P.F.I. and scholastic marks for those pupils whose P.F.I.'s decreased was *plus* .16.

4. The coefficient between number of extra-curricular activities and scholastic marks was *plus* .10.

5. The coefficient between P.F.I. and I.Q. was *minus* .25.[3]

ANALYSIS

The results seem contrary to what might generally be expected. That pupils under any circumstances should increase in physical fitness while decreasing in scholarship is only one step worse than the general state of affairs—that there is no relationship between the two functions. The very low correlations, however, might be considered an indication that the teachers generally failed to take advantage of pupils' increased physical powers to stimulate more effective study. The mass trends or averages (as shown in graphs I and II) clearly indicate the facts as revealed by the data.

To combine all sets of measurements on a single scale for graphical purposes the following tabulation was prepared. (See page 272.)

(This scale is only approximate in the relations among the three items. It was made up simply as a means of placing all the sets of measurements on one graph. It should not be used for any calculations or measurements.)

Four possible explanations of the conditions revealed are suggested:

1. There is no *reasonable* relation between scholarship and physical fitness. But the absurdity of this conclusion was indicated in the first statements of this study.

2. The causal or effective relation between physical health and

[3] The predictive indices of all these coefficients indicate less than 2 per cent agreement between the functions compared.

scholarship, though positive, is so small that it does not show any measurable effect one upon the other. But if this were true, scholars as scholars would be justified in neglecting their own health. Then was that profound scholar Schopenhauer wrong in advising that "to neglect health for any other advantage in life is the greatest of follies?"

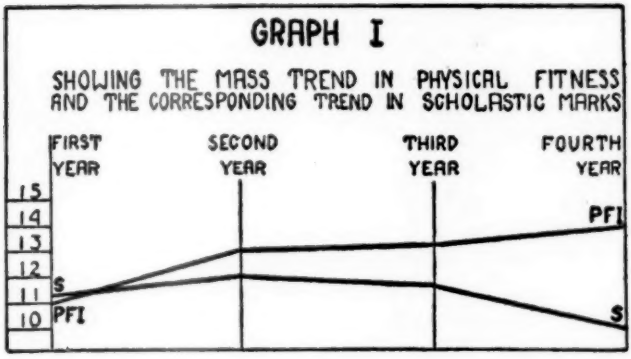
TABLE I

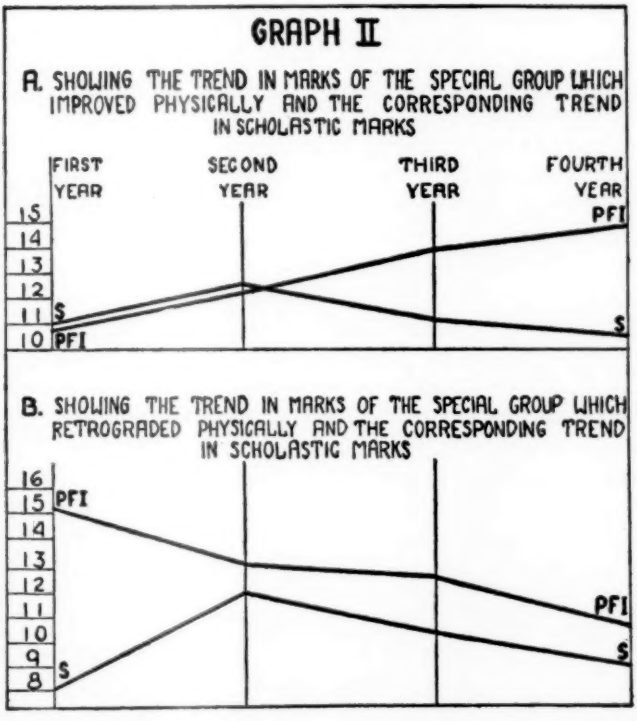
Percentile	Scholastic	P.F.I.	I.Q.
26		153.5	
25		148.0	
24		143.5	
23		138.0	129.36
22		133.5	126.18
21	95.0	128.0	123.00
20	93.2	123.5	119.82
19	91.4	119.0	116.64
18	98.6	114.5	113.46
17	78.8	110.0	110.28
16	86.0	105.5	107.10
15	84.2	101.0	103.92
14	82.4	96.5	100.74
13	80.6	92.0	97.65
12	78.8	87.5	94.38
11	77.0	83.0	91.20
10	75.2	78.5	88.02
9	73.4	74.0	
8	71.6	69.5	
7	69.8	65.0	
6	68.0	60.5	
5	66.2	55.0	
4	64.4	51.5	
3	62.6	47.0	
2	60.8	42.5	
1	59.0	38.0	

3. Teachers failed to lead or drive or otherwise stimulate pupils to use their increasing physical powers to the best advantage. Stated otherwise, the successful efforts of the physical education staff to improve physical fitness were lost on pupils so far as improved scholarship was concerned. These conclusions concerning the failure of Lynbrook teachers to utilize pupils' physical powers seem most reasonable *if measuring procedures were valid.* But:

4. Either the physical fitness tests or the scholarship ratings may be relatively invalid. But the P.F.I. has been found to be one of the most reliable and objective measures in educational use, having a reliability coefficient of .97. Moreover, it possesses perhaps the most scientifically standardized norms of any educational tests and has been validated by scores of experiments.

Then are scholarship ratings invalid? Yes, and notoriously so, when they are the usual teacher ratings. A voluminous bibliography bears testimony to this observation. Even Regents' examinations lack norms





relative to pupil potentialities; therefore, these are not to be trusted in contrast or comparison with P.F.I.'s. We must conclude, then, because teachers' marks and even Regents' examination ratings are highly subjective and lack any usable norms—or any true norms at all—that statements concerning the relation between true scholarship and physical fitness must wait for studies in which scholarship ratings possess proved integrity in norms, reliability, and validity.

It is interesting, too, to discover the lack of correlation between "number of extra-curricular activities" and scholarship and between I.Q. and P.F.I. Evidently studies do not tax pupils' powers, or the scholarship—or health—of those electing the larger number of outside activities would decline.

The negative correlation between I.Q. and P.F.I. is well known. Rogers[4] reports a coefficient of *minus* .10 for 347 high school boys. Reasons for this actual lack of positive relationship are not obscure. As maturity approaches, the more intelligent pupils are led by teachers and parents to concentrate more on mental than on physical activities. Consequently their physical fitness declines, temporarily, and their P.F.I.'s in high school drop. That this condition is temporary and contrary to the usual rule of positive correlations between desirable physical qualities and intelligence is borne out by many studies.[5]

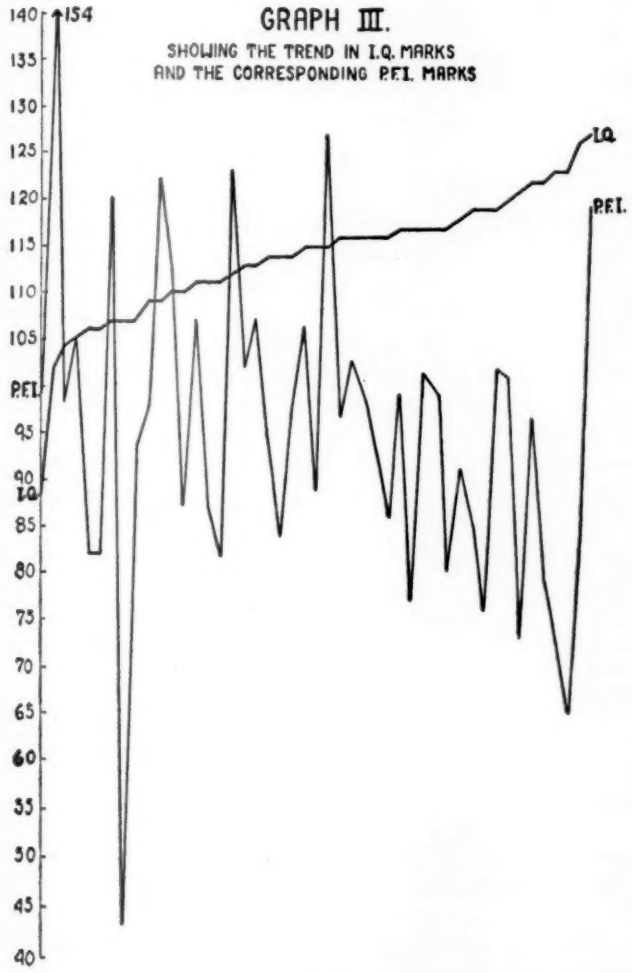
OBSERVATIONS

Further analysis bears out the above conclusions. Scholastic marks generally reach a peak at the end of the second year and then fall off for the third and fourth years to a point below that of the first year. But the lack of scholastic norms renders impossible the conclusion that true learning declines. Perhaps teachers arbitrarily mark more severely in upper grades. Perhaps the subject matter increases in difficulty more rapidly than the increasing maturity of pupils. In either case, if scholarship is defined in terms of scholastic accomplishment—rather than in terms of subjective, unreliable, invalidated, and un-normed teachers' marks—the conclusions of this study might be revised and the teachers vindicated. As it is, they seem to be convicted by a traditional but much-discredited marking system of failure to use the increased power gained in physical education to the scholastic advantage of pupils.

On the other hand, pupils' P.F.I.'s continued to rise steadily until the peak was reached at the end of the senior year. Two points may be made to support the conclusion that this gain is real. First, the P.F.I. tests are properly normed for both age and weight. As pupils (boys or girls) grow older and heavier, their norms increase. Therefore, increased P.F.I.'s indicate growth in fitness *beyond normal expectancy.* Second, P.F.I.'s calculated for freshmen, sophomores, juniors, and seniors in schools where programs are not adapted to individual needs as revealed by objective tests show almost steady declines in fitness for each higher class, the usual drop being about two P.F.I. points per year through both high school and college. *The accomplishments of the academic teachers in the Lynbrook High School,* as measured by school records and because of failure to relate progress to norms, *remain uncertain; but those of the physical educators are certain and positive.*

[4] *Fundamental Administrative Measures in Physical Education,* p. 246.

[5] Frederick Rand Rogers. *Physical Capacity Tests in the Administration of Physical Education.* Chapter VII and accompanying bibliography, 1925.



An interesting sidelight which was revealed in analyzing data is the fact that athletes are not necessarily possessed of greater physical fitness than athletically average pupils. Several subjects with as high as nineteen athletic activities in four years have P.F.I.'s below one hundred, while some with seven to ten non-athletic pursuits have P.F.I. ratings above one hundred. Athletes have high Strength Indices, but not necessarily high Physical Fitness Indices.

One further conclusion might be drawn, if scholarship marks could be trusted to represent true scholastic attainments. It will be observed from Chart I that pupils with average and increasing physical fitness may or may not waste their physical powers; but pupils with declining physical fitness are almost certain to be handicapped scholastically.

The Ankle Lever and Its Classification

By F. H. Pratt, M.D.

AUTHORITIES persist in assuring us that man is supported a-tiptoe by the calf muscles through the aid of a lever of the second class or order—that is, by an effort applied to the heel which under the conditions can amount to only a fraction of the body weight, since the ground must support as fulcrum the remaining lesser fraction. Huxley's classical diagrams (Fig. 1) will serve to recall the conventional designation of levers, as well as the accepted application to the case in point.

A paradox, however, appears when one observes that the above interpretation is contrary to fact—that rising on the toes does not produce levitation, as any platform-scale will show. A satisfactory resolution of this paradox has been available for many years, as may be seen by reference especially to the writings of one of my early teachers, Dr. George Wells Fitz; but, simple as it is, the analysis has persistently escaped recognition, and so needs reiteration. The difficulty arises, of course, from the obvious truth that the raising agent (calf musculature), unlike the gardener lifting a wheelbarrow, is *part of the thing raised*. Can we, then, recognizing this complication, regard it as even a special case of second-class leverage?

A recent and authoritative medical school textbook of physiology pictures a typical second-class lever with its source of power supplied by an *externally suspended* gastrocnemius muscle. As the diagram stands, the author is quite logical in his comment that "power (of body lift) is gained at the expense of speed and extent of movement," for this is the necessary property of such a lever. But unfortunately he also states that this class of lever "is illustrated when the body is raised on the toes." It will eventually be seen that the two statements are quite irreconcilable. I am reminded that even a physicist has included in his examples of the second-class lever the case of the oar in propelling a boat, as if the oarsman (like the muscle) were supported from without instead of *riding in the thing propelled*.

In his entertaining *Engines of the Body*, Sir Arthur Keith pictures a chisel prying open a box. Insert the chisel under the lid, raise the handle of the tool, and the lid now ascends like the body on tiptoe. But Sir Arthur has forgotten to stipulate that to complete the example the operator must sit or stand on the lid *and rise with it*.

Returning to Fig. 1, we see that the raised foot tapping the floor is given as an example of the first order of lever, while the foot lifting the

body from the floor is made to illustrate the second order. Let us compare the equivalents of these two cases in a fancied experiment.

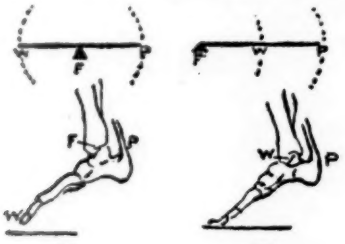


FIG. 1.—First and second class levers, with their customary application to foot extension. (After T. H. Huxley, *Elementary Lessons in Physiology*.)

Imagine yourself in a bed just long enough for a full stretch from top to heel. You try to extend the feet. Resistance is felt, not only against the balls of the feet, but equally against your head. Think now of Huxley's first diagram: conscious only of the toe pressure, you of course think in terms of a first-order lever (which it obviously seems to be). Now shift your attention to the head pressure—positive evidence that the body is trying to "raise" itself horizontally in accordance with the second diagram. You now doubtless think in terms of a second-order lever (which it obviously seems to be). But at this instant the foot-board gives way under the effort, and your toes appear on the far side—a first-class demonstration of pure and simple relativity! Is it sufficient to say that the frail foot-board, failing to play *fulcrum* to an apparent second-order lever, is suddenly transformed into the obvious *resistance* (weight) of a first-order lever? What if both head and toes were to break bounds simultaneously?

Leverage is most conveniently studied as equilibrium rather than as motion. In *a*, Fig. 2, a body weighing 150 lbs. is supported by a lever system plainly of the second order, and so placed that 100 lbs. of the "weight" must by computation be supported by the "power." Does this (as we are generally taught) fit the case of a man standing tiptoe on one leg? No, for we are leaving only 50 lbs. "fulcrum" pressure at the ground or on the platform-scale.

Try the next arrangement, *b*, Fig. 2, where we now attempt to correct the above defect by granting the 150 lbs. full body weight which we know the "fulcrum" must bear if we are to apply the scheme to man. But other figures must now be revised: "power," for example, must be raised to a tension of 300 lbs. So far so good; but note that "weight," instead of remaining the postulated body weight of 150 lbs. must, by the necessary addition of the two supporting tensions, swell to

450 lbs. We have preserved the classification of the lever, but in so doing have again excluded its application to man.

In the third diagram, *c*, Fig. 2, we do the obvious thing—fit the facts by hooking up our "power" arm, not to an outside source of support, but to the system itself. When this operation is performed on *a*, its whole aspect changes; for without increasing the weight of the body we now get the full value of that weight exerted at the ground, while the greatly increased joint pressure is fully accounted for by the muscle tension which adds its value (as down-pull) to the body weight at the joint. Is this a lever of the second class? Apply one by one the numerical criteria of this class, and they all fail: the body pressure at the "fulcrum" is not partial, but complete; the power tension, trebled; while the joint tension, instead of equalling body weight, is likewise three times as great. Turn the system upside-down, as in *d*, merely substituting a 150 lb. weight for the equivalent ground-pressure. Lo, a lever of the *first* order with every condition satisfied—a key to the situation.

If doubts still lurk as to the legitimacy of according full class-one status to the tiptoe mechanism, consider that the muscle does not, as it must in class-two operation, ***shorten*** through a larger arc than the "weight" describes, but through a smaller one: power (of rise) is not "gained at the expense of speed and extent of movement." Therefore in this respect alone we cannot be dealing with a lever of the second

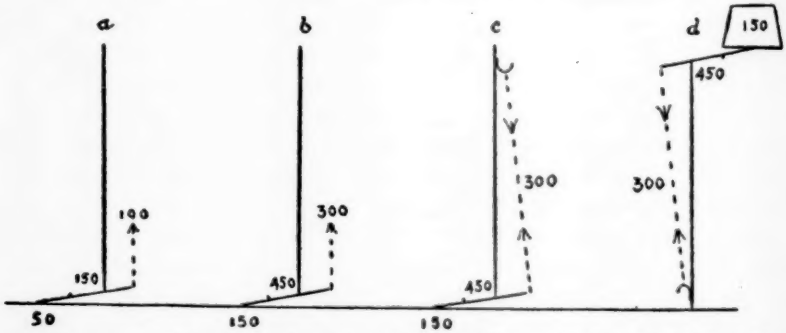


FIG. 2.—*a* and *b*, second class levers carrying different loads. *c* and *d*, first class "ankle" levers, showing relative identity of dynamic conditions. For simplification, all adjustment to center of gravity and diagonal stress is neglected.

order, whereas it is easily computed that the actual extent of muscle shortening fits exactly the specifications of the first order.

The teacher has a wide field of possible examples in emphasizing the principles involved, and in bringing the current misconception to an amusing *reductio ad absurdum* (cf. Fig. 3). To imitate truly the tiptoe mechanism we must sit on a trunk when we open it, stand on the plank

that we would raise at one end from the ground, and become passenger as well as lifter of the wheelbarrow. In performing such feats (all quite possible with connecting gear and proper deference to the center of gravity) respect is gained for the Herculean prowess of the gastrocnemius and its co-workers. On the other hand, to imitate in himself the generally conceived mode of heel-raising, man must either employ

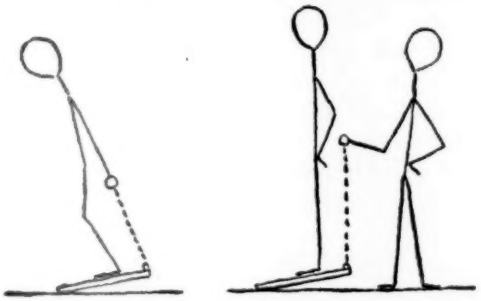


FIG. 3.—First and second class efforts (to be quantified by the pupil).

an assistant to lift upon his bootstraps or else cut away the calf muscles from their bony origin and, preserving nerve connection only, hang them on the wall. Only so can he conform to the requirements of second-class leverage—that is, to heel-raising conditions as commonly assumed and too commonly expounded.

The practical upshot lies then in the recognition, first, of the enormous first-order tensions that the calf muscles have been developed to produce and withstand; and, second, of the even greater joint tensions borne by the arch when the muscles are in action against a multiplied gravity. All such factors tend to be obscured if a superficial view of fundamentals is permitted to influence the teaching of joint-muscle mechanics; for these fundamentals must form the basis of the many modifications and compoundings of forces that enter into the final picture of activity.

REFERENCES

Fischer and Steinhausen. In *Handbuch der normalen und pathologischen Physiologie*, VIII 1, 642–643, Berlin: Springer, 1925. (With technical references.)

Fitz, G. W. *Principles of Physiology and Hygiene*, 53–60. New York: Henry Holt & Co., 1908.

Hall and Bergen. *A Text Book of Physics* (revised), 259–260. New York: Henry Holt & Co., 1897.

Haycraft, J. B. "Animal Mechanics," in Schäfer's *Text-Book of Physiology*, II, 251–252. Pentland, Edin., 1900.

Martin, H. N. *The Human Body* (briefer course, 5th ed.) revised by G. W. Fitz, 65–66. New York: Henry Holt & Co., 1898.

(Most of the current texts which consider the subject may be consulted for the traditional point of view.)

Personalities and Performances

JOHN DEWEY'S characterization of any man as his *ways of behaving* suggests the best clues to the personalities of this symposium's authors. What our authors have done in the way of philosophy or research should reveal what they are. How they have told it is revealing too; though the editor, in the interests of brevity, has perhaps too often obscured what is most characteristic of many of the studies. *Il y a toujours la manière,* as the Frenchman says. There is always the manner of doing things, which is most significant.

But a scientific, or semi-scientific, or even a pseudo-scientific report of necessity obscures much of an author's personality. Moreover, what he says—especially when it has been abstracted from a larger work, or is a mere summary of data and therefore but a part of a larger theme—is likely to be misunderstood or misplaced in the scheme of things. It is the editor's obvious duty and pleasure, therefore, to close this symposium with a rapid review of the various studies and of the personalities of their authors.

* * * *

The symposium begins with a statement of the place of measurement in a rational physical education program, with specific illustrations from the rapidly developing program in the "Empire State." It is fitting that **W. W. H. Mustaine**, since 1917 Assistant Inspector of Physical Training, and later Supervisor of Physical Education in the New York State Education Department, should have prepared this résumé. Mr. Mustaine was educated in Kentucky, at Center College, and at the State University in 1899–1900. He has also studied at Chautauqua, Yale, Harvard, and elsewhere. He is a prolific writer on physical education subjects. Only recently he completed, as chairman of a special committee of the A.P.E.A., a report of "Physical Education Objectives and Policies." His whole professional life has been for a generation, and still is, devoted to promoting "the acceptance by educators of a broad interpretation and a sound method of conducting physical education in public schools and colleges."

Kenneth H. Murray's report includes helpful suggestions to physical educators concerning the calibration of instruments, the adaptation of what one has to what one needs, and the possibilities and functions of measurement in the adaptation of secondary school physical activities to individual needs and measurement of results. Mr. Murray has been, since 1930, Director of Physical Education in the Westmount High School, Quebec. His previous professional experience includes two years as Director of Physical Education in the Mt. Royal Branch,

Y.M.C.A., Montreal, and two years as executive secretary of this institution. He graduated from Springfield College in 1927, and has a Higher Diploma from McGill. He has already published several articles on physical education. He was for three years President of the Province of Quebec Physical Education Association. Since 1933 he has been a member of the Legislative Council, Canadian Physical Education Association.

Elizabeth B. Wellman's Master's Thesis, of which the included study is a summary, is a model of sound experimental and statistical analysis. Miss Wellman approached the problem of evaluating various tests of motor ability in an impartial spirit and emerged with surprising results. Her findings ought to be highly instructive to women physical educators in search of valid measuring instruments for high school girls and college women. Miss Wellman is an instructor in the (now) Sargent College of Physical Education of Boston University, of which she is a graduate, as well as of the School of Education of Boston University (1928). Her chief interests are in teacher training, particularly its theoretical aspects. She has travelled particularly to Bermuda and in the West Indies.

V. F. Hernlund has been active in physical education measurement research for the past fifteen years. His articles in this *Supplement* suggesting the relative values of various physical tests for Y.M.C.A. secretaries and uses of the P.F.I. in organizing programs in a junior college are but two of a number which would have been included, but for the pressure of duties incident to establishing himself in his latest post during last December. Mr. Hernlund is now Supervisor of Physical Education Activities, Chicago South Park District. He has been in physical education work in schools, Y.M.C.A.'s, and playgrounds since 1915, in Minneapolis and Chicago, and has instructed in George Williams College, the Graduate School of Nashville, Chicago University, and Vanderbilt University. Mr. Hernlund graduated from George Williams College in 1927 and 1930, and from the University of Chicago in 1930 and 1931. He has published several articles on physiological subjects, and is familiar with every State east of the Mississippi.

Neal G. Barfield, who collaborated with Mr. Hernlund in assaying the Emory Junior College program, graduated from Mississippi State College in 1927, majoring in civil engineering. He took a higher degree from the Y.M.C.A. Graduate School at Nashville. He is now Director of Physical Education at Emory Junior College and Academy, where he has been since 1929. He has spent six summers in community recreation programs. At Emory his intramural schedule includes sixteen sports. His whole interest is in physical education.

Harold L. Berridge, author of the study "An Experiment in the Psychology of Competition" is Director of Health and Physical Education of Edinburg College, Edinburg, Texas. He received two degrees

from the State College of Washington in physical education. He has had a varied experience in the field of physical education; was a physical director of a Y.M.C.A. even before attending college, and has been a student instructor, teaching fellow, and varsity wrestling coach in college, and supervisor of health and physical education in the public schools of Longview, Washington. He is a member of the committee on "Standardization of College Curriculums in Health and Physical Education" in Texas and several other committees for the State Department of Education and State Society. At present he is working on some psychological aspects of motor ability traits.

Harold R. Danford writes interestingly and challengingly of the measurement of foot conditions. He fearlessly—and correctly we believe—rejects some apparent evidence to adduce contrary conclusions. His study ought to stimulate many others along similar lines. Mr. Danford graduated from Ohio University in 1932 and Boston University in 1934. He is Director of Boys' Activities in the Webster Junior High School, in Auburn, Maine. He has taught in Ohio, and in 1934 was Summer Director of Recreation at Warwick Transient Camp in Massachusetts.

C. H. Hubbard has made what appears to be a notable improvement of the silhouettograph. This technique for measuring posture, all too seldom used in the past, has thus been twice improved, Cureton's *conformateur* technique being the other. Mr. Hubbard graduated from Amherst in 1912, and from the Harvard Summer School of Physical Education in 1916. He is now Director of Health and Physical Education at Arnold School, Pittsburgh. He was formerly an assistant director at Western Reserve University in Cleveland, and Western Reserve Academy in Ohio. His major interests, characteristically enough, are orthopedics and foot arches. He is also proprietor of a summer camp in New Hampshire.

John M. Harmon wrote his Ed.D. thesis in the field of health and physical education surveys. The excerpt briefed in this symposium is taken from that dissertation. It is intended for continuous self-survey purposes. Dr. Harmon graduated from Missouri Wesleyan College in 1921, and from Indiana University in 1930 and 1932. He has been a college and university coach and athletic director since 1921 in Central Wesleyan and Evansville Colleges. He now is Director of Physical Activities for Men at Boston University. His major professional interest is athletic administration. During the War he served for several months in France and has travelled extensively in Europe.

Joanna Thayer Dyer has demonstrated once more that the simplest methods are often best. Like strength tests as measures of physical fitness, the Back Board Test of Tennis Ability is surprisingly easy to administer! But it has been validated beyond criticism, it is highly reliable and fascinating to take, and it provides a fitting climax and conclusion to

Part I, for her study is at once highly practicable and statistically and experimentally sound. Miss Dyer graduated from the Boston School of Physical Education in 1926 and Teachers College, Columbia University in 1932 and 1933. She has taught in Woman's College, University of North Carolina, North Texas State Teachers College, and the New York State Teachers College at Buffalo, where she is now head of the Physical Education Practice School. She has been counsellor at summer camps during several summers and travelled in Europe in 1928.

Rochester, under Herman J. Norton, Director of Health Education, was the first large city to experiment seriously with P.F.I. tests, and modify programs to meet needs as revealed by tests. **Carl G. Chamberlain** did much of the work, worrying, and research. His research includes, with that of Dr. Dean F. Smiley's of Cornell, the first validation of the P.F.I. using medical ratings as the criterion. Mr. Chamberlain studied at Rochester and Cornell Universities, and graduated from Ithaca College (1929) and Cornell (1930). He has served on the faculties of the two last-named institutions. He was Director of Health and Physical Education in the Charlotte High School from 1921–28, and since 1930 has had the same responsibilities in the new and very large Benjamin Franklin High School. His articles are well known to physical educators. He particularly enjoys camping, music, and books, and has travelled in Europe.

J. J. Carter has probably had to explain his local program to more people than has any other physical educator in America. Professors of school administration as well as physical education have sat at his feet in the "early days," while neighboring physical directors skeptically stood by. Mr. Carter was a graduate of Battle Creek College in 1915. He has been at Lynbrook since 1921, having begun teaching in New York State in 1916, the first year of compulsory "physical training." During the War he served eighteen months in the Aviation Section of the Army. He has been, since 1929, a member of the New York State Physical Education Syllabus Committee. He is President of the Long Island Health and Physical Education Association and Chairman of an embryo Section on Administrative Measurements of the A.P.E.A. He speaks occasionally to associated boards of education and similar organizations. His major interests are the reconstruction of physical education, measurements, and his Camp Hickory for boys and girls. His title is Director of Health and Physical Education of the Lynbrook, New York, Public Schools.

Harold W. Herkimer and **B. North Parsons** cooperate so closely in the supervision of health and physical education programs in Niagara Falls that they had to remain inseparable in reporting how "D" groups may best be handled. Mr. Herkimer has been Supervisor of Health and Physical Education at Niagara Falls since 1930. He was supervisor of physical education in that city from 1922 to 1930. He

has taught elsewhere. He took diplomas from Springfield College, in 1916 and 1928. He is now President of the Western New York District Health and Physical Education Association.

Mr. Parsons prepared at Cornell University and Ithaca College. He had been a teacher in three schools before going to Niagara Falls in 1925, where he is the physical director in the Senior High School. He travels extensively in the United States and Canada. His chief interests are health, physical education, and sports of all kinds.

Physical educators in the Albany or Capitol area of New York were startled, in 1928, to hear a young woman talk confidently and at great length of the individual needs of scores of different girls. How she knew was revealed in "a chart." Promotions soon took **Helen M. Chesky** away from the Oneida School, where she had for but two years been Physical Director for Girls, but her interest in individual work never lagged. Miss Chesky is now the Physical Director of the Nott Terrace High School in Schenectady, New York. She graduated from Arnold College in 1926 and has taught also in Oswego, New York, and the Kentucky College for Women. She travelled in Europe in 1930. Her chief interests are orthopedic work for school children and the Schenectady Civic Play House. Her report on methods of meeting individual health needs for junior and senior high school girls is a characteristic document.

Leonard Clark has demonstrated what may be done in a single semester with boys who respond actively to tests and corrective procedures. The average physical fitness of Melrose's high school boys is, perhaps, as high as that of any similar group in the nation. Much of this fitness must be laid at Mr. Clark's door. He has been, since 1933, Boys' Physical Director at Melrose High School. Formerly he was a physical director in schools at Montreal and Newburyport and in the Melrose Y.M.C.A.

William H. Whiting has provided public school directors of physical education with an excellent form for reporting progress in activities to administrative officers. Mr. Whiting's outline may be followed easily by directors, no matter what tests they use. Incidentally, the results he reports, for an initial experiment in meeting individual needs, are challenging! Mr. Whiting was a graduate of Springfield College in 1917. He has been in Quincy since 1910, and for the past ten years has been Supervisor of Physical Education for all public schools of that city.

Donald A. MacKenzie has provided this symposium with a thorough analysis of the effects of various collegiate physical activities on participants. This report should be greatly suggestive to college administrators in physical and health education. It shows that various activities have different effects on students, as might be supposed—but he rightly suggests that the methods used by coaches, instructors, and

supervisors may be more effective in improving fitness than the type of activity followed. Mr. MacKenzie was a graduate of Northeastern University in 1931 and 1932. He is now Assistant Director of Student Activities and an Instructor in Physical Education at that institution. Previously he was Instructor in Chemical Engineering. His previous writings were on the rise of tellurium in the vulcanization of rubber and a study of the relationship between participation in extra-curricular activities by college freshmen and their scores in intelligence tests. His special interests are physical education and industrial chemistry.

Arthur L. Jones wanted to answer parents and principals who asked "should boys work or go to camp during summer vacation?" So he sought the answer in a study of physical fitness of various types of summer activity. Mr. Jones graduated in health education at the East Stroudsburg Teachers College, and is studying physical education at Boston University. His study is a summary of his master's thesis which will be presented to the faculty of the University of Maine this spring. He is Director of Physical Education at Framingham, Massachusetts, and has been a physical instructor at Catasauqua and Gettysburg, Pennsylvania; Providence, Rhode Island; Boston; and the University of Maine. He served twenty months overseas with the Canadian Expeditionary Forces, and has been a member of Massachusetts State Committees preparing new courses of study in physical education.

J. Wayne Wrightstone has generously contributed a significant document to the literature of camping; for it reveals not only that positive health values do accrue in well-managed camps, but also the direction which changes in methods must take to be true improvements in camp management. Dr. Wrightstone, who is Research Associate at Teachers College, Columbia University, is a graduate of the University of Pennsylvania (1925), New York University, and Columbia University, from which institution he received his doctorate. His special interests include tests and measurements and other means of securing progress in education and camping. Dr. Wrightstone has written several monographs on educational subjects. His experience includes also that of teacher and principal of the Summit Public Schools in New Jersey.

James A. Wylie has become an outstanding expert in physical fitness testing, program making, and boy scout camp management. His study of the effects of camping on physical fitness provides highly significant data for camp managers everywhere. Mr. Wylie is a graduate of the Savage School for Physical Education in New York City, in 1930; and Boston University. Since 1931 he has been Supervisor of Gymnastics for Men at Boston University. Previously he was an Associate at the Westfield, New Jersey, Y.M.C.A., a Director of Physical Education in the New York Bankers' Trust Company, and in the Boys' Club, New York. Mr. Wylie's chief interests are teacher training, boy scout work, and camping.

John B. Malcolm's report constitutes one of the greatest promises of a worthy future for supervised physical activity which the editor of this symposium has had the privilege of reviewing, for the measurement techniques it reports are equally applicable to physical education in private and public schools and colleges, Y.M.C.A. health and recreation programs, and to all supervised camping programs, whether private or semi-public—whether Y.M.C.A., Y.W.C.A., boy or girl scout, or others. The duties of testing and individual analysis involved in Mr. Malcolm's program may seem arduous to the casual reader. But the ends fully compensate those who, eagerly or otherwise, devote themselves to the careful analysis of individual needs.

Mr. Malcolm graduated from the George Williams College in 1928. He is at present Director of Recreation and Health at the Hyde Park Y.M.C.A., Boston. He has been a Y.M.C.A. physical director at Buffalo, at Oak Park, Illinois, and the Y.M.C.A. Executive Secretary in Cairo, Egypt. He has done field work for the International Committee of the Y.M.C.A. and has directed Y.M.C.A. boys' camps for seven years. His interests lean strongly to research and travel—he has visited, at one time or another, most eastern States, the eastern provinces of Canada, and practically every nation of Europe and the Near East.

Intramural sports, their organization and management, have been **H. Harrison Clarke's** major interest for ten years. While at the Chautauqua High School, in 1925–31, he promoted an excellent program, which was but a stepping stone to Syracuse University, where he has been since 1931 as Instructor in Physical Education, and Director of Intramural Athletics. Mr. Clarke stimulated and guided Mr. Bonesteel in the latter's study of methods and consequences of equalizing athletic teams by the S.I. His educational degrees are from Springfield College and Syracuse University. He has published extensively on various topics. He is an authority on touch football, also on intramural athletic administration, and is particularly interested in measurements. He is also President of a newly-formed Intramural Section of the College Physical Education Association.

Harold A. Bonesteel introduced P.F.I. tests into his high school in 1933-34, with immediate results: parents flocked to the school to learn what it was all about. Soon a nearby community found it needed his services, but Manlius citizens were insistent that he remain with them. Mr. Bonesteel's study of equalizing teams is a stirring challenge to small-school directors of intramural reports. He attended Cornell in 1923–25, graduated from St. Lawrence in 1929, and has since taken graduate work at Columbia and Syracuse Universities. He is Director of Health and Physical Education for Boys at Manlius High School, where he also teaches science. His hobby is training and riding horses. He has travelled considerably in the United States and Canada.

Harry G. Oestreich has experimented with physical fitness tests in

both Minnesota and Massachusetts. His Master's thesis, from which the report included in this Supplement is an extract, recorded several experiments related to the improvement of Y.M.C.A. physical education programs. Mr. Oestreich graduated from Gustavus Adolphus College in 1928 and Boston University in 1934. He is now Supervisor of Intramural Sports at Boston University, and was for five years Director of Athletics and Physical Education at Alexandria, Minnesota. His special interests include the relation of "the philosophy of physical education to the philosophy of human society," and the application of physical fitness tests to industry. In 1932 he travelled in Europe.

Walter A. Cox, Kenneth B. DuBois, and nineteen members of the physical education staff of the Albany, New York, Public Schools prepared five studies concerning the equalization of the powers of opposing individuals or teams. Their reports bear eloquent testimony to the thoroughness with which Albany has attacked the problem of providing the fairest possible conditions for boys and girls to enjoy athletic activities, and the most productive conditions for the development of their social traits. They also demonstrate the propriety of equalizing opposing players in individual as well as team sports.

True to their philosophy of equalization and socialization, the Albany staff demurred when we asked for brief biographies for this symposium: "Have opportunities always been equalized?" they asked —to study, travel, write articles! Nevertheless, it would be unfair to readers to hide the Albany lights under a bushel. Readers will need to know that Mr. Cox has been Director of the Bureau of Health Education at Albany since 1931. Previously he had been active in physical education in Wisconsin, Indiana, Pennsylvania, and New York City. He is a graduate of the Normal College of the American Gymnastic Union, of the University of Wisconsin, and of Columbia University.

Mr. DuBois is Assistant Director of Physical Education at Albany. He graduated from the New York State College for Teachers in 1933, and has been a physical educator in New York State high schools. To the nineteen associates of these gentlemen we are equally grateful for the various Albany reports.

Robert E. Laveaga's report in this symposium of preliminary testing of Northeastern, Harvard, and Boston Optical College students promises to be the forerunner of an important series of research and administrative studies by himself and his associates. Mr. Laveaga graduated in 1922 from the Y.M.C.A. College of Chicago (now the George Williams College). Since 1930 he has been Director of the Recreation and Health Department, Boston Y.M.C.A. Previously he was physical director in Y.M.C.A.'s in Reno, Nevada; Sacramento and San Bernardino, California; and in Chicago; and served during the War in the Army. He is a recognized authority on volleyball and has written texts for this sport and concerning recreation institutes. His

major interest is to "maintain the physical education and recreation programs of the Y.M.C.A. in keeping with modern educational objectives." He has travelled throughout the United States and is interested in oil painting.

Elizabeth Zimmerli began collecting case reports of "unusual P.F.I.'s" in the summer of 1934. These brief studies barely suggest what strength tests may reveal when physicians as well as physical educators, recreational leaders, and camp directors become better interpreters of physical fitness test results. Miss Zimmerli is a graduate of the Sargent School (now College) of Physical Education (1927), of Boston University's School of Education and of New York University. In 1934 she became Director of Physical Education for Girls at the University of Minnesota High School and Instructor in Physical Education in that University. She has taught physical education at the Bridgewater and Worcester, Massachusetts, State Teachers Colleges and physical activities at the South Orange Junior High School. Miss Zimmerli, with her sister, once toured Germany on bicycles and has also travelled in the United States and Canada.

Harold K. Jack has gone afield in investigating the relations between various sociological factors and physical fitness. His studies are interesting and highly instructive because they indicate what may be done with larger numbers of cases and other sociological data. Mr. Jack is Director of Physical Education in the Marshall, Minnesota, Public Schools. Formerly he was a teacher of physical activities and coach in Walker and Deer River, Minnesota. He graduated in chemistry and biology at Hamline University and in physical education from New York University. He has written elsewhere on corrective physical education and is particularly interested in measurement and sociology.

When **L. Charles Rosenberg, M.D.** projected an experiment with a non-meat diet for underweight children, he was not content to measure improvement in terms of gain in weight alone. His search for a supplementary test led him to incorporate strength tests in his study. The surprising revelation of the possibility of sex differences in dietary needs was one result. Dr. Rosenberg was graduated from George Washington University in 1916. He is Head of the Department of Pediatrics, Newark Beth Israel Hospital, and a Fellow of the American College of Physicians, the American Academy of Pediatrics, and the New York Academy of Medicine. His publications are numerous, including studies of inguinal hernias in young infants, early diagnosis and treatment of poliomyelitis, ketogenic diet in pediatrics, etc.

Bessie L. Park has added, in this symposium, to the literature which demonstrates the need of more valid measures of skill; and has raised in a challenging way the problem of differentiating girls' activities from those for boys, whom girls have too long copied to their own detriment. Miss Park has been, since 1915, Director of Physical

Education for Women at the Cortland Normal School, New York. Previously she had been Acting Head of the Women's Department at the University of Nebraska, and an instructor in the University of Texas, the State Teachers College, Emporia, Kansas, and in Chautauqua and Cortland public schools. She is a graduate of Arnold College, and has done graduate work at Harvard and Boston Universities. Miss Park has written extensively in her field and has acted as chairman of numerous committees revising State Syllabi in Physical Education and other important projects.

Charles D. Giauque's public and private interests have been health education and physical education these many years. His analysis of Alexander J. Wall, Junior's material on the relation of physical fitness to scholarship simply carries forward into a new field a very old love. Professor Giauque graduated from Oberlin College in 1916 and from The Ohio State University in 1928. His experience has been chiefly in four widely separated areas: in New York one year, in China seven years, in Ohio seven years, and in Massachusetts three years. While in China he was at various times Director of Physical Education in Shanghai Public Schools, Professor of Physical Education in the Government Teachers College, and Principal of the American Academy at Tsingtao. At Ohio University he was Associate Professor of Physical Education. Professor Giauque is now Professor of Health and Physical Education at Boston University and Editor of the *Physical Education, Health, and Recreation Digest.*

Frederick H. Pratt's delightful analysis of leverage demonstrates beyond peradventure a common error of anatomists and kinesiologists. To read this demonstration is to enjoy an exquisite lesson in pure measurement. The Boston University School of Education and the authors are under a pleasant burden of gratitude to Dr. Pratt for his closing theme. Dr. Pratt studied at Harvard, receiving his baccalaureate degree in 1896, and his M.D. in 1906. He has been, since 1921, Professor of Physiology at the Boston University School of Medicine; he was formerly Instructor in Physiology and Hygiene in the Boston Normal School of Gymnastics, and the Department of Hygiene at Wellesley College, and Professor of Physiology at the University of Buffalo. He has published extensively on the physiology of muscle. His special interests are cellular activity of muscle and nerve—and natural history. In 1899 he was a student at the University of Göttingen.

"Work is the law. Like iron that lying idle degenerates into a mass of useless rust, like water that in an unruffled pool sickens into a stagnant and corrupt state, so without action the spirit of man turns to a dead thing, loses its force, ceases prompting us to leave some trace of ourselves on this earth."

—from a notebook of Leonardo da Vinci

Boston University Summer Session

1935

July 1st to August 10th

Boston University offers to undergraduate and advanced students an opportunity to combine a summer vacation in New England with study in one of America's cultural and historical centers. Two hundred and nineteen courses are offered by regular members of the Boston University faculty and visiting lecturers and instructors in practically every field of study. The professional courses for teachers and educational administrators are unusually complete. Others in the arts, sciences, languages, business administration, religious education, theology and law are available to teachers also.

The summer climate in Boston is ideal for study; the famous Boston Public Library is two minutes' walk distant; and all New England is within easy reach on week-ends.

Address:

ATLEE L. PERCY, *Director*
Boston University Summer Session
688 Boylston Street
Boston, Massachusetts